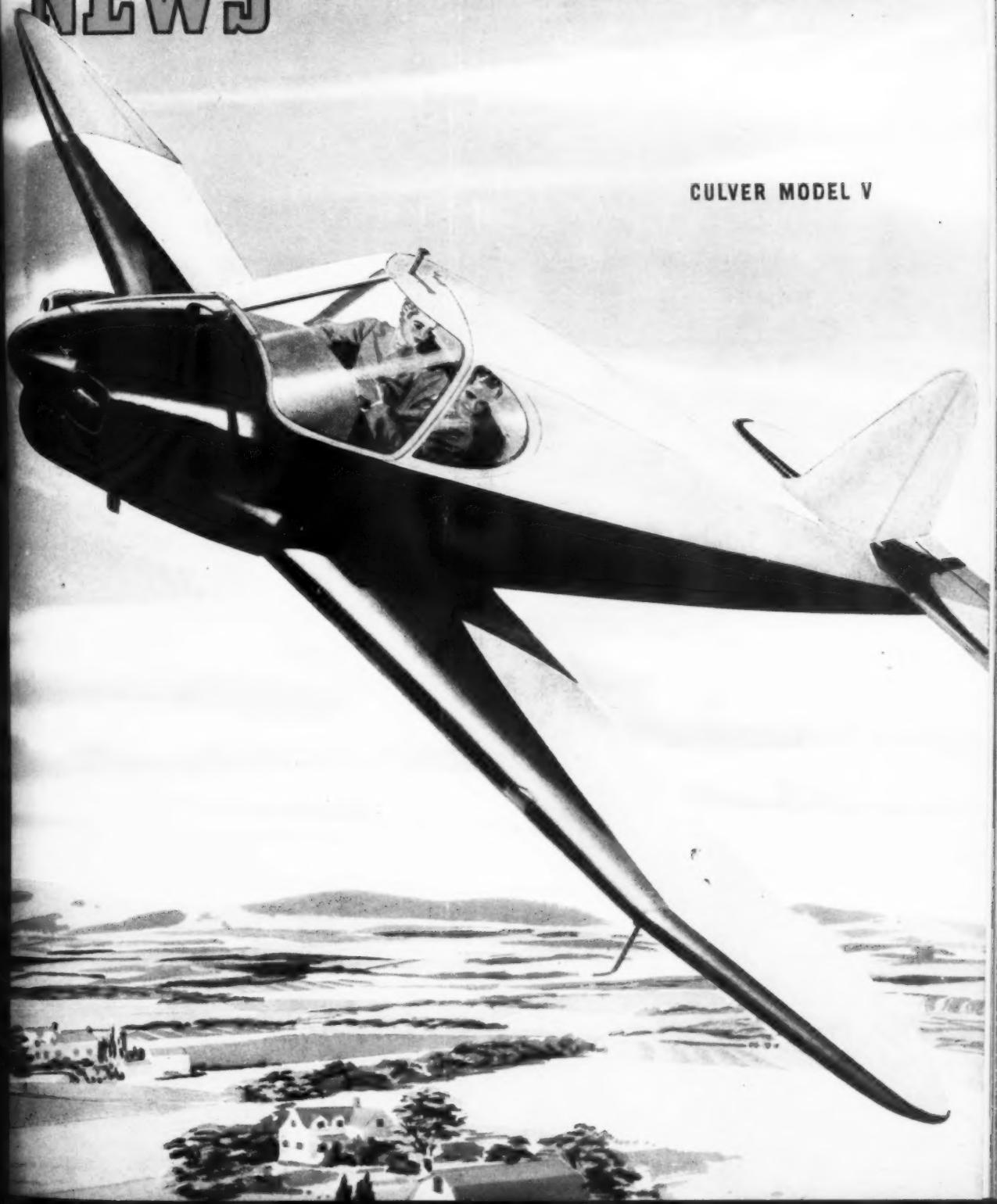


MODEL AIRPLANE NEWS

CULVER MODEL V



View! THE C-54 SKYMASTER TRANSPORT



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Here it is! Testor's outstanding new solid scale model of the C-54 Skymaster Transport . . . the plane that carried troops on world-wide missions and bringing them home! Easy to build, this kit introduces Testor's exclusive "slot-slide" construction . . . a triumph of simplified model-building perfected in our own plant by our own wood-working experts. Add the C-54 to your collection of history-making planes. You get everything you need complete in one kit — fully shaped wood parts, clear-plastic discs for propellers, cement, all grades of finishing paper, printed trim and insignia, photographically detailed instructions and assembly drawings, and . . . very important . . . a kit of Testor's sensational new finishing materials, together with instructions manual, as described below! We sincerely believe this C-54 is one of the greatest values in the entire model field . . . are confident you will think so, too. Call your dealer for a kit today . . .

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MODEL AIRPLANE NEWS

GEORGE C. JOHNSON JAY P. CLEVELAND
Publisher General Manager

MARCH, 1946

VOL. XXXIV, No. 3

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AN AIR AGE PUBLICATION

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THIS NATION OWES no greater debt to any of its revered heroes than it does to Gen. of the Army Henry H. Arnold. Never in history has an armed force been more the personal expression of an individual than the U.S. Army Air Forces. From its lowest private peeling potatoes at an Air Base kitchen, to its high generals directing sweeping strategic air campaigns, all this vast panorama of men and machines was the personal, dynamic manifestation of this greatest airman of all times. Arnold is as old as the original Wright Brothers' Flier, as new as the Boeing B-29 Superfortress, as inexperienced as the shot-gun riflemen of the Punitive Expedition into Mexico, as wise as the strategic concept of the air-war in the Pacific. It was right that the United States, creator of the airplane, should produce the greatest air leader; it was right that this greatest air leader should be Henry H. "Hap" Arnold. As he steps down from the office he created—Chief of the Air Forces—he leaves a void that may never again be as capably filled, for no man will ever again have the opportunity or the responsibility of creating the greatest aerial weapon in history from scratch—"Hap" Arnold has seen to that.

GEN. CARL A. "TOOEY" SPAATZ brings to the office of Chief of the Air Forces a tremendous flying and fighting record, a knowledge of modern air power and what it means gained from the shot, smoke and hell of two wars. He was to Arnold what Eisenhower was to Marshall: his top field commander, his translator of strategic directives into battles, of broad incisive policies into victories. He assumes the reins of the world's largest and most powerful air force. May he touch the sure and his thinking clear.

A BILL TO CREATE a separate air force, equal in status to the Army and the Navy has been introduced by Representatives Vinson and May. This bill might herald a new recognition of air power were it not the 17th such bill since 1919! Of greater promise is Senator Mitchell's bill which would create a National Air Policy Board. Older readers who recall the historic effort of the Morrow Board of 1925 which resulted in the Army and Navy Five Year programs and the Air Commerce Act the following year, may see the far-reaching and badly

(Turn to page 90)



(Above) Huge new Boeing fighter, the XF8B-1, which can carry 6400 lb. bomb load. The 3600 hp engine can hurtle the ship along at better than 450 mph. (Below) DeHornet is long range fighter with two 2070 hp engines and a top speed over 470 mph; armament is four 20 mm. guns



MODEL AIRPLANE NEWS • March, 1946

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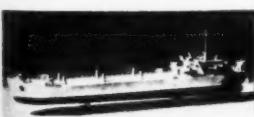


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NEWSLETTER

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And speaking of competition . . .

THAT CONTEST DOWN PHILADELPHIA way last fall still has the boys talking. Sponsored by the Philadelphia Record and directed by Everett N. Angus, the first "flying circus" probably was the biggest first-time meet of its type ever held. Talk already is of a bigger and (if possible) better meet next fall. A big share of the credit goes to genial Bill Greene of the Record.

AMONG THE MANY IDEAS that have been proposed to the AMA for consideration and possible use is a Standards Bureau operated for the benefit of the model aeronaut. The suggestion is not new and has been worked out in other fields. For a while the Hearst Jr. Birdmen operated a testing lab and would put their stamp of approval on items they found of sound materials and design. The lab was a success mainly because of the efforts and experience of Irwin S. Polk, now of Polk's Modelcraft Hobbies. After Irv left the Birdman organization its Standards Bureau never did function as well. It later died a natural death with the club itself. Now it has been proposed that the AMA enlist the services of properly qualified technicians and undertake to check kits, motors and certain types of materials. The idea is that those found fit would be so labeled by the Academy, a sort of Good Housekeeping Institute for model aviation. You must admit the plan has merit. How to put it into operation so it will do the greatest good in the question. Perhaps you have the answer? If so, send your suggestions to the Academy's planning committee—its members will be glad to hear from you.

D I S C O U R S E - O F - T H E - M O N T H:
We've been sort of sniffing around lately asking various experts and leaders what they thought was ahead for aeromodeling. One of the best replies came from W. Hewitt Phillips, aeromodeler par-excellence, at present head of the Stability and Control Section of NACA's Flight Research Division at Langley Field, Va. Hew, many times a national meet winner, last year won the Sperry award presented annually to a young man for outstanding achievements in the field of aeronautics. So much for his background, which is considerable—his ideas are of special interest. In answer to our query on what the future holds for model aviation, friend Phillips opened up with an evaluation of the activity:

"I think that one of the greatest benefits of model building is the free training it gives to the builders in the solution of engineering problems. Model builders in the past have reached solutions to the problems that confronted them, so that the models entered today in the popular contest events approach perfection, at (Turn to page 10)

MODEL MAKERS INSIST UPON

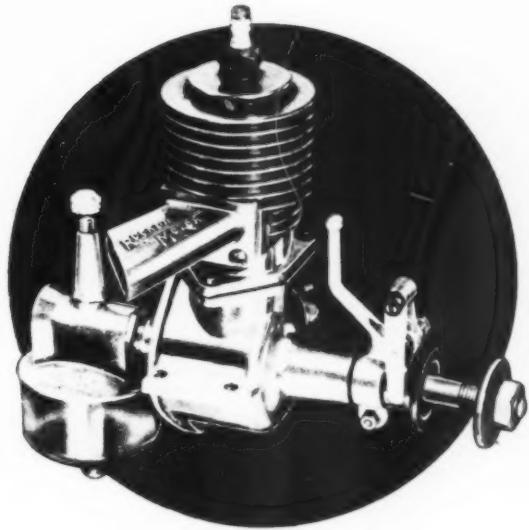
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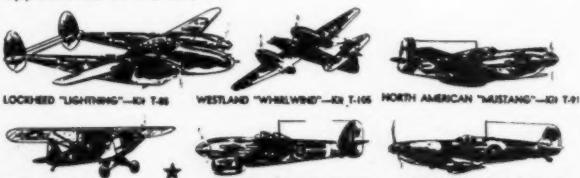
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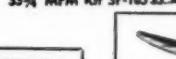
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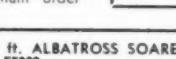
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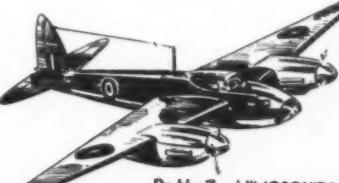
Douglas A-20 "HAVOC or BOSTON"
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De Havilland "MOSQUITO"
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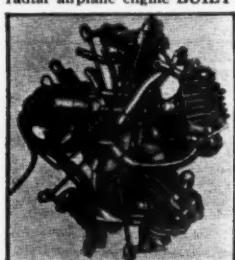
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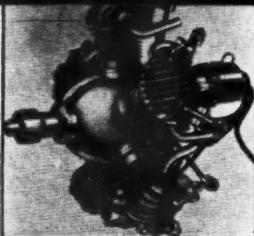
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(Continued from page 6)

least as far as can be attained with available materials and power plants.

If the value and popularity of model building is to be kept up in the future it will be necessary to invent new problems, new contest events, new types of models and power plants. Take indoor models for example—the endurance of indoor models has gone up from 4 minutes in 1930 to 26 minutes in 1940. The goal of a 30 minute flight still remains as a challenge to builders, but it soon will be attained. In this event the problem is to secure the greatest possible endurance with a model of given wing area using a rubber motor.

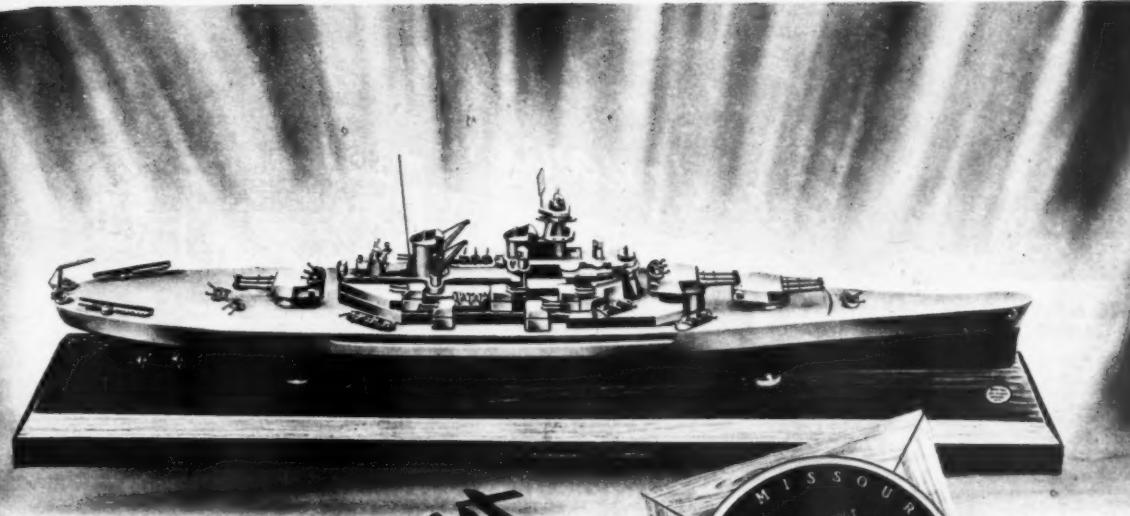
"The main part of this progress," Hew continues, "is due to improvements in design and workmanship of the models. A big boost, of course, was achieved with the invention of microfilm. Now the materials, balsa wood, microfilm, tungsten wire and rubber seem to be fairly well standardized, and the workmanship and design problems have been solved to such an extent that the endurance of the models approach the theoretical maximum. Unless some radical new super-light construction material is invented to replace balsa wood, the endurance of indoor models will continue about the same as the present records, and the interest in this type of flying will probably die out gradually. If some radical new material is invented, the duration of the models will probably become so great that a contest will be impractical, and again the event will become unpopular. Thus it appears that in order for indoor flying to remain popular, new events will have to be introduced to provide a fresh incentive for the model builder.

"The same argument holds in a less definite way for outdoor rubber and gas events. In these, the element of chance always remains to make a contest more interesting. In these types of models, the aerodynamic and structural design is highly perfected, though considerable development in gas motor design still appears possible."

We asked Phillips if he thought there would be many new types of contests. He felt that a hard question to answer. But he asked, "who could have predicted the popularity of U-control flying before its fairly recent invention? Yet, this is an excellent example of the type of new development needed to keep model building popular. Some new developments achieved during the war may lead to important advances in model building. These include new construction materials like plastics, and new types of glues for stronger construction. Jet propulsion intrigues every model builder, but unfortunately this type of power plant is very inefficient at the speeds attained by conventional models. Probably the biggest field for development is the control of models. Radio control will undoubtedly be increasingly popular. Some other means of control less complicated and more within the means of the average builder is needed, and this problem is probably the most important facing the model builder of today."

It looks as though there's much food for thought in what our boys say. Do you agree? Maybe you have that "other means of control" in the back of your mind. If you have, speak up, friend, speak up.

A POINT WE'VE BEEN meaning to mention for quite some time now (as a matter of fact, ever since this column started) is a little recognition for the gas (Turn to page 50)



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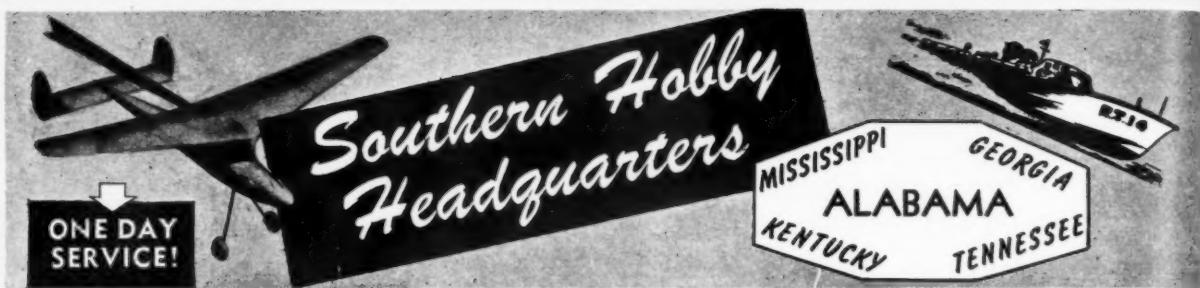
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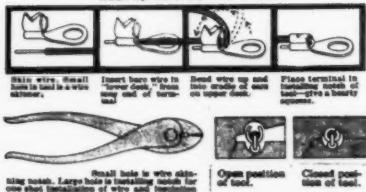
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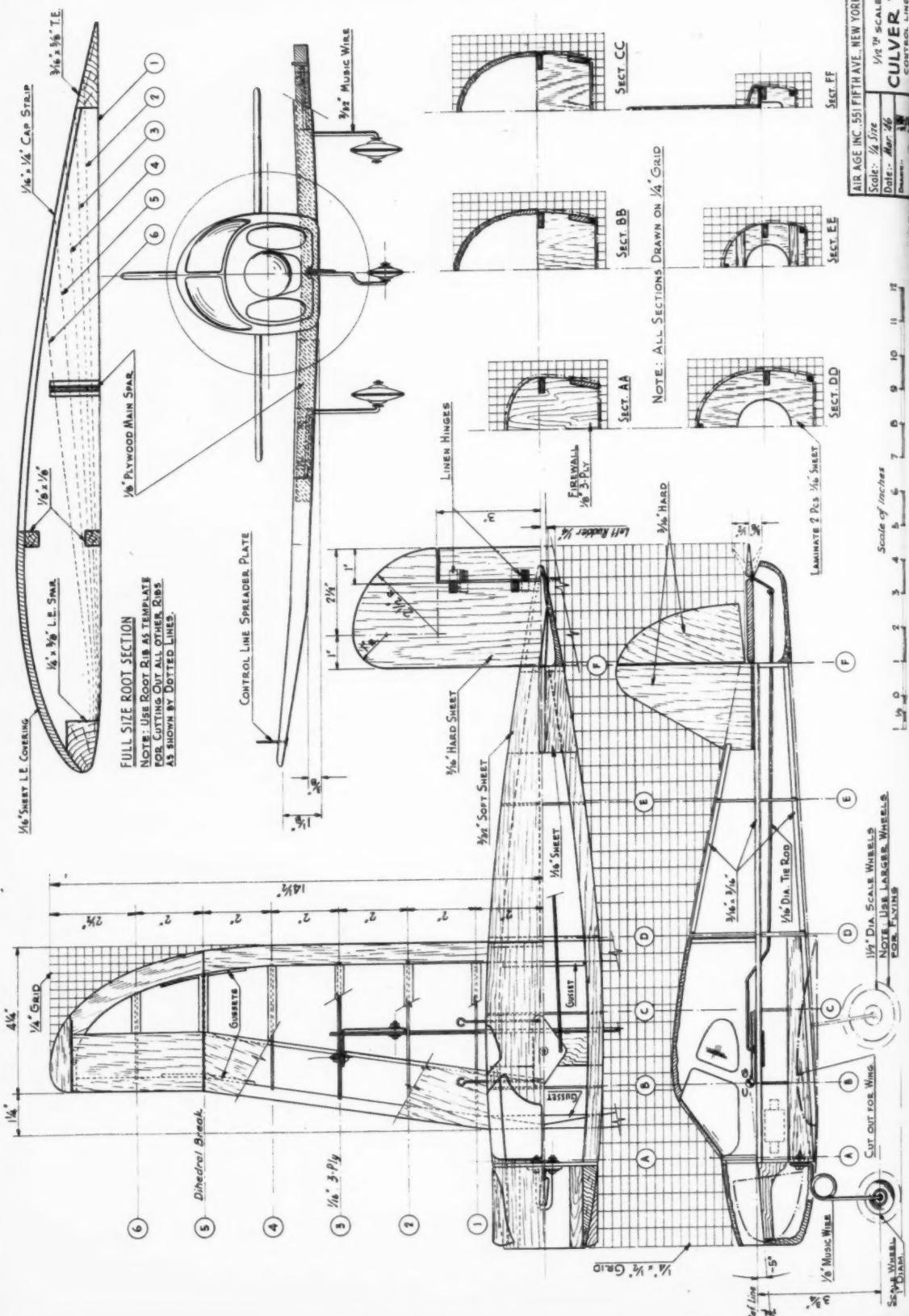


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PLANE ON THE COVER MODEL

by R. A. TESSIER



model
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V

THIS model has two valuable qualities. It is almost exactly to scale—a virtue made possible by the design of the prototype which lends itself admirably to model work—and as a model in its own right it has proved itself to be unusually easy to handle.

With the thought in mind that weight does matter, an attempt was made to lighten the structure as much as was practical without sacrificing strength. The original idea of carving and hollowing out a solid chunk of balsa was discarded, not without misgivings, for it would have cut down construction time and may not have added more than 3 oz. at most to the total weight. The builder with a preference for the "Hollow log" type of construction, therefore, should not necessarily be swayed from his favored method and may build it the way he thinks best. Certainly the plans will serve as a guide for either technique.

After making a full size construction layout, the fuselage is started. Lay down the crotch and by means of temporary cross braces keep it rigidly to its correct plan form. The firewall and formers indicated at sections A to F are to be accurately cut out; upon this depends the flow of body contour and, more important perhaps, the ease with which it may be sheeted. Do not expect the desired degree of fidelity to contour by merely enlarging as closely as possible the quarter-size sections on the drawing. True, with the grid lines shown, reasonably accurate formers can be drawn; but unless they are further checked against the plan and elevation on the construction layout discrepancies are bound to appear. The thickness of an ink line enlarged 4 times, for instance, can throw the whole alignment out.

With the formers cemented to the crotch there remains only the addition of the $3/16"$ square stringers and the inlay of $3/16"$ hard sheet between stations A and D before the skeleton structure is complete. Check for alignment, and if necessary pin in a few temporary diagonal braces to retain proper squareness while the cement is drying. Fin and rudder are next cut out and sanded to a smooth

finish. Note that rudder is permanently offset to the left and that the entire assembly is cemented to the structure. The top $3/16"$ square stringer has been cut away to admit the fin into which the stringer is then mortised.

Sheet the entire bottom half of the fuselage with $3/32"$ very soft sheet, and rough-shape the hollowed out tail block which is attached at station F.

Stabilizer and elevator assembly is next. The elevator crank, formed from $1/16"$ steel wire, is pressed into the elevator and cemented; then elevator and stabilizer are hinged together as shown. It will be best to connect tie rod to elevator crank before the stable-elevator assembly is permanently cemented to the tail block. When this is dry, sheet top of fuselage between D and F with soft $3/32"$ balsa.

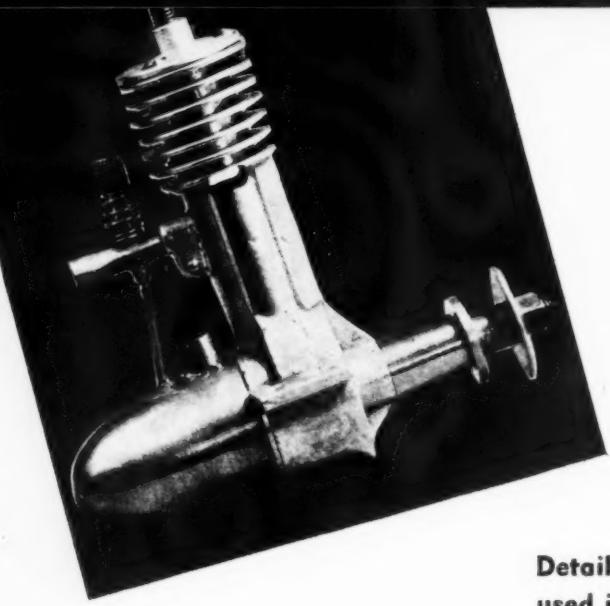
At this point the bellcrank may be made and attached to a piece of $1/16"$ plywood about $1-1/2"$ wide and long enough to span the crotch. Connect the tie rod, previously cut and bent to size, to the bellcrank and then cement the plywood strip to the underside of the crotch making sure at the same time that the position of both bellcrank and elevator is neutral.

Make up a block of medium balsa large enough to fit between stations A and D. Carve to outline of the canopy leaving it about $1/32"$ oversize. Hollow out to about $1/8"$ to $5/32"$ wall thickness and trim up the window openings. Leave plenty of material at the post between windshield and window, or else reinforce it with a piece of $1/16" \times 3/16"$ strip. A former of $1/8"$ thickness is cemented into the canopy at A and D as shown on the plan. Tack the semi-finished canopy to the crotch with four small drops of cement and set aside to dry.

Of the cowl and motor mounting nothing much can be said. Except for the 5° "downthrust," which is definitely recommended, the method of mounting and to some extent the shape of the cowl is dependent upon the motor used as well as upon the personal preference of the builder. Assuming that the cowl has not

(Turn to page 47)





italian diesel engine

Details of the miniature "diesels" widely used in Europe—in this case from Italy

WITH the advent of peace, model airplane enthusiasts in Europe are working with renewed interest on their hobbies. The diesel engine which I'm going to describe is almost in full production in many Italian firms and is definitely here to stay. Considering the fact that Italy was practically without electrical equipment of any sort it is only natural that they should attempt (and with success) to work out a good substitute.

I have found that after several years of severed connections the Italian aeromodelers are anxious to again make contact with their American friends. They are quite willing to exchange ideas and to show us what has been done in Italy during the period of forced separation, and to learn what we Americans have done. I'm sure a barter of ideas will be profitable to both nations since much progress has been made with problems that interest the modeler.

I had the opportunity to speak with many Italian modelers and to see their different model planes and engines. The only conventional type (as I understood engines then) that I saw was a German pre-war gas engine with the usual spark plug and electrical system. All the rest were of the new diesel type.

It is a well known fact that the usual type electrical ignition engine has several distinct disadvantages. Foremost, the dead weight of the electrical equipment is generally equal to that of the engine

alone, thereby increasing the wing loading with an obvious effect on gliding ratio. Moreover, the principal causes of malfunctioning are due to the ignition system which is not easily made to operate perfectly. Logically the Italians, being short of electrical equipment (batteries, coils, etc.) have relied on the advantage gained by using the diesel type.

These engines could appropriately be called "compression ignition engines." The ignition of the gaseous mixture is accomplished by the heat of a rapid compression at a high ratio. Considering the volatile fuels used, this combustion can be readily conceived. Carburetion is the same as employed on conventional model engines.

I should like to relate how the present accomplishment was attained. As far as I can find out the first experimentation along these lines was carried out in Switzerland on semi-diesel or hot head types. In these, ignition for the first power stroke is produced by an electrically heated copper block situated in the cylinder head. This block retains the heat for the continuing cycles.

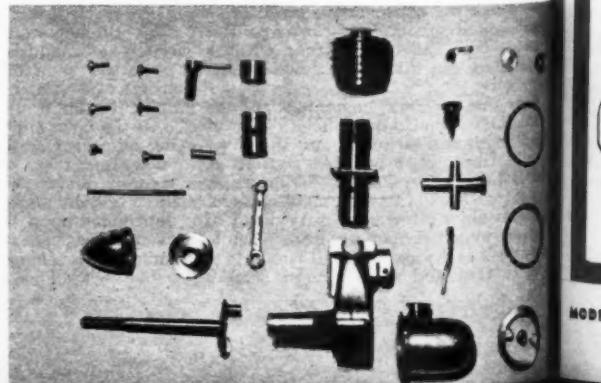
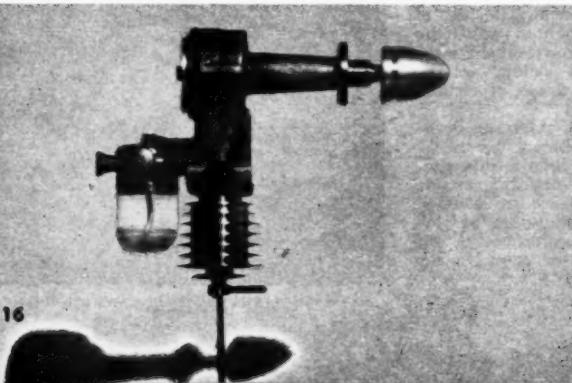
Some rather interesting experiments were conducted in Italy by Vantini (Padua) who first made tests on conventional engines where the spark plug was replaced by a small coil of platinum wire.

When starting, the coil was heated by a 4 volt battery. Cooling of the coil after the battery was disconnected and pre-ignition were prevented by taking special precautions. The results obtained were excellent but the fragility and high cost of the platinum coil made it impractical.

To appreciate this compression ignition engine we must investigate some of the difficulties encountered. The main problem was one of finding a method by which the compression ratio could be varied while the engine was operating. This was achieved by a Swiss firm (Klemm Schenk) that employed a twenty year old English patented device which had been impractical when first invented. This firm created the now famous *Dyno 1* and their patent solved the problem. The compression ratio was varied by means of a counter piston in the cylinder operated by means of a screw or cam. Immediately numerous Italian modelers set to work studying the engine, realizing that with the war already started there would be an acute shortage of electrical equipment. Not only the larger firms but small workshops and many experienced modelers labored for several years to produce successful diesels. All this remarkable interest, naturally, brought out many types which while they were not completely satisfactory, served to urge the modelers on to further improvements.

Among the first types produced:

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by CHARLES H. GRANT

An expert analysis of
more "dream ships"

MOST young men, especially of the creative type, feel it necessary to occasionally express their ideas in one form or another. This is a natural reaction of the creative mind. They resent orthodox procedure and are spurred to create something new, something different. Such expression commonly takes the form of all sorts of new and fantastic airplane designs some worthwhile, others faulty. Improvement is only possible when faults are recognized and corrected—and expert criticism is necessary. This column is established to give this criticism and to endeavor in every possible way to show the fundamental principles underlying design, whether large craft or models, so that readers will benefit and obtain knowledge which may be useful in their future aviation activities.

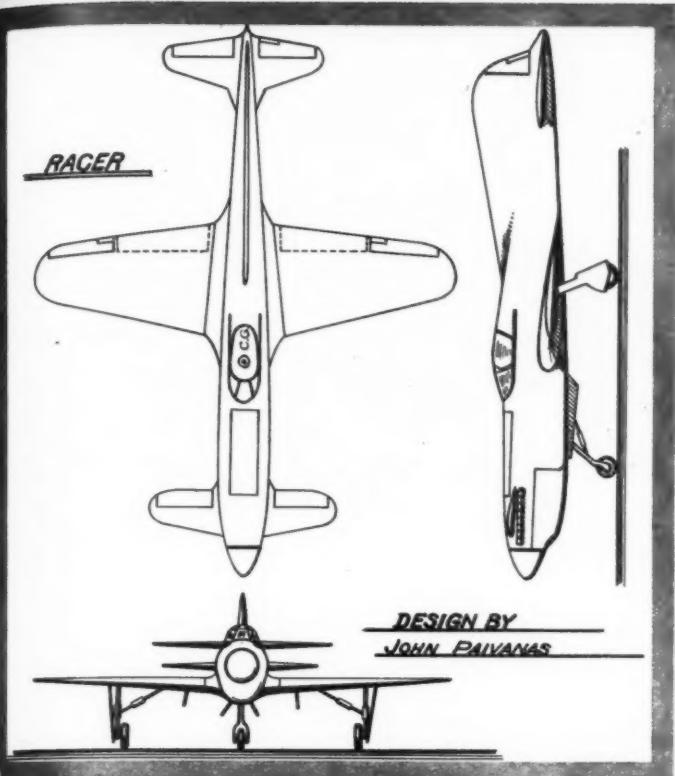
A number of interesting designs were sent to us recently. One of the most unusual comes from Pvt. J. A. Paivanas, No. 12104132, Squadron O—Barracks 132, 3505th A.A.F. B.U., Scott Field, Ill., shown on this page. It is especially pleasing because of its contours and graceful appearance. Usually this is the first consideration of any project. Some people say, if it looks good—it is good. Let us see how well Pvt. Paivanas has fulfilled his task of designing.

The design of any airplane hinges around and is totally dependent upon its purpose. Its efficiency is determined by how well it fulfills this purpose. So we see here that this old saying, concerning a plane being excellent if it looks good, is not necessarily true. The plane itself can show aerodynamic efficiency in some particular phase of performance, but its general design may be such that it does not fulfill its purpose to the fullest extent. For instance, if you design a plane for speed and finally find that its proportions do not give speed but instead long duration or high altitude, it certainly is not an efficient design in respect to speed though it may be efficient in gaining altitude.

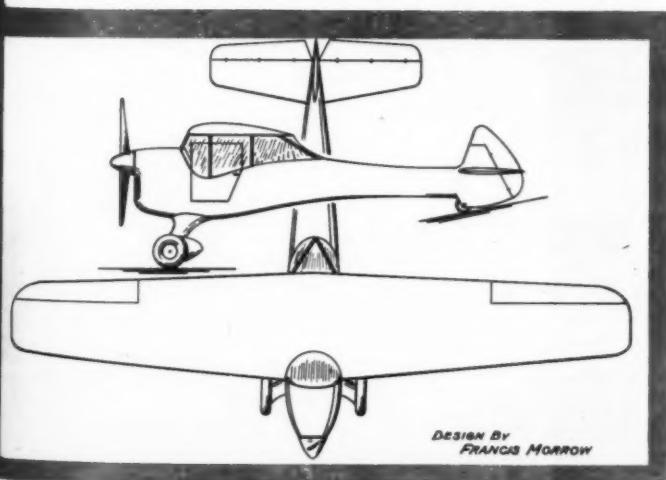
The units required for any airplane, whether for speed or other type of performance, are basic. There must be a means of lift, power generating unit, stabilizing means (tail surfaces in the case of an airplane), a landing gear, controls, and some form of structure to hold all these essential units together. These are included in this design; in fact there are more units than absolutely required. This plane has not only tail surfaces but also a front lifting elevator and resembles, in general arrangement of tail and elevator, the old Curtiss Pusher of 1908. Apparently there seems to be nothing new unless it is the form in which things are presented. All of these units are well designed with correct aerodynamic form, indicating considerable basic knowledge of the subject; also they have approximately correct relative size and position from an aerodynamic standpoint.

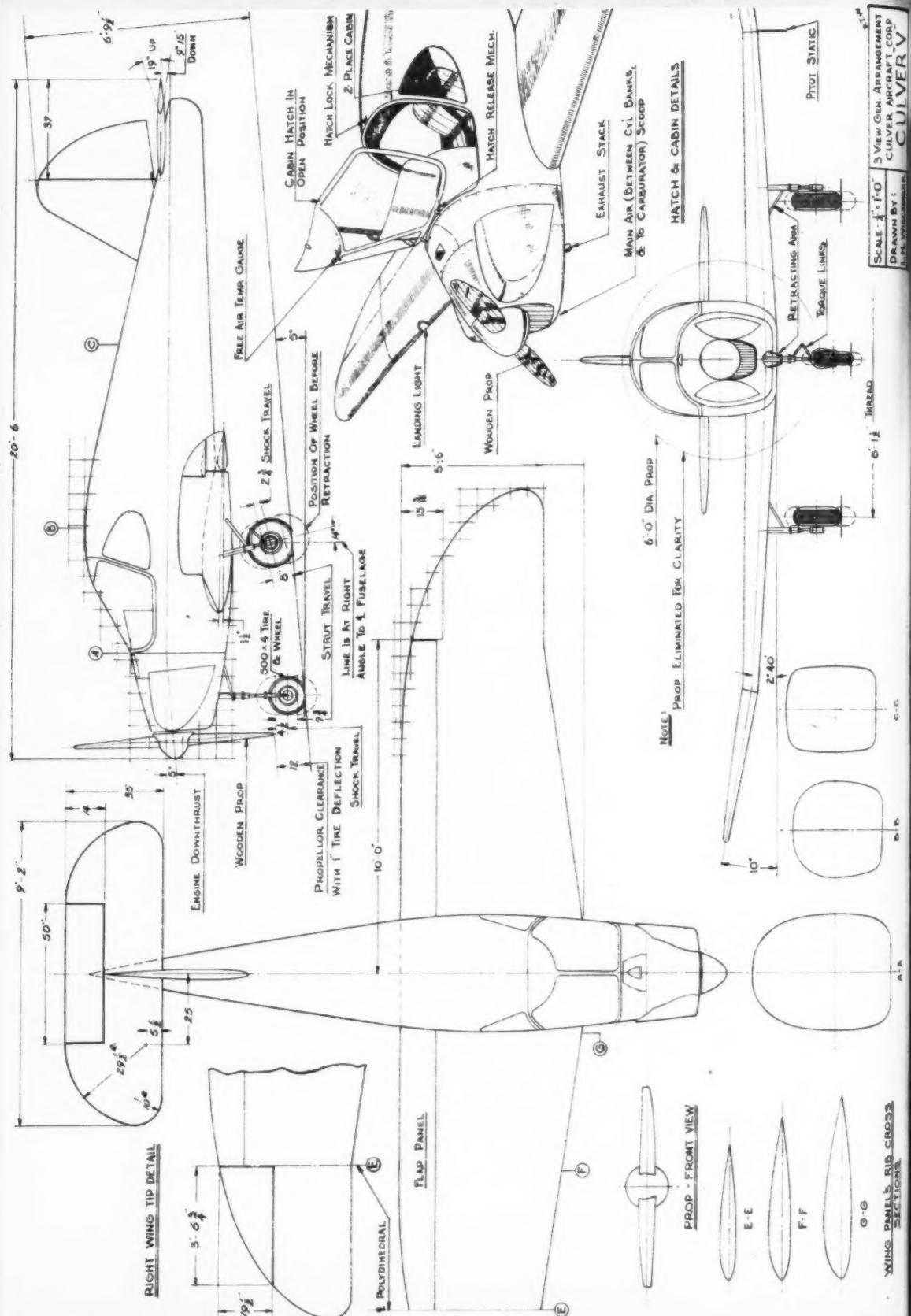
The next consideration is balance, which often goes by unnoticed but which is absolutely essential if the airplane is to fly efficiently and stably. After looking over your airplane and satisfying yourself concerning the shape, size and

(Turn to page 58)



design forum





PLANE ON THE COVER

by ROBERT MCLAREN



Here is a big ship with the upturned wing-tips that model critics have decried for years

culver
V

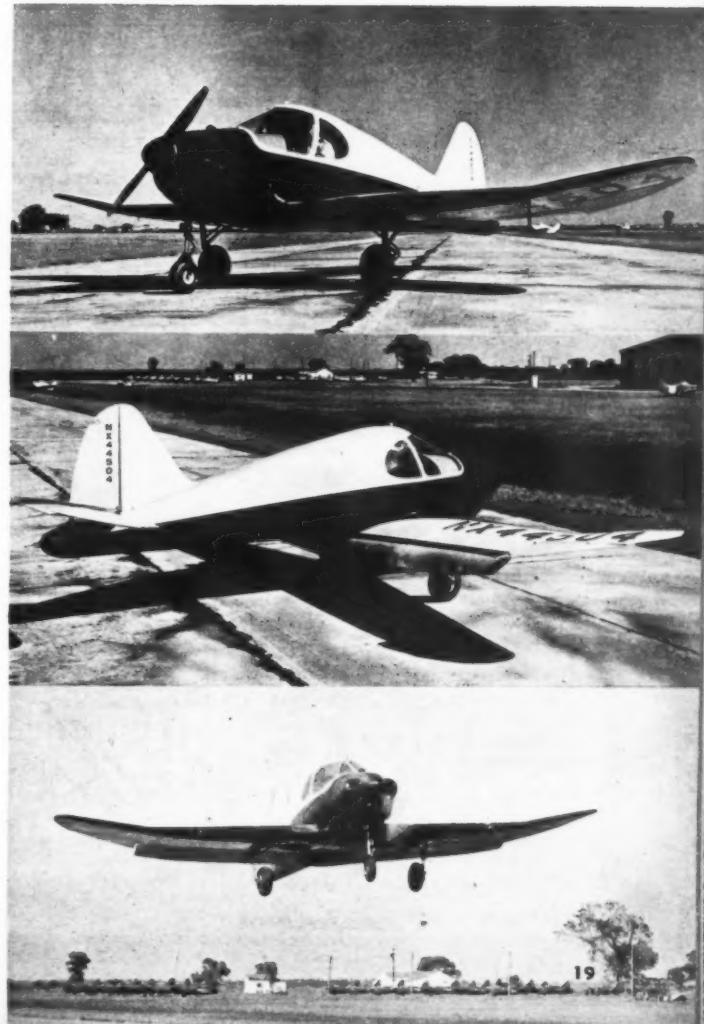
WITH 50,000 customers lined up at the gate, America's personal aircraft manufacturers are hard at work ripping out warplane jigs, scrapping special tools and clearing out their production lines to produce a stream of lightplanes for the greatest pent-up airplane market in history. But even in this air age of radar, supersonic speeds, pressure cabins, electronic auto-pilots and hundreds of other war-born developments, the flying public has been cautioned that 1946 models are going to be, for the most part, slicked-up 1940 models with minor new features. That, at least, is the best that most of the big producers can promise.

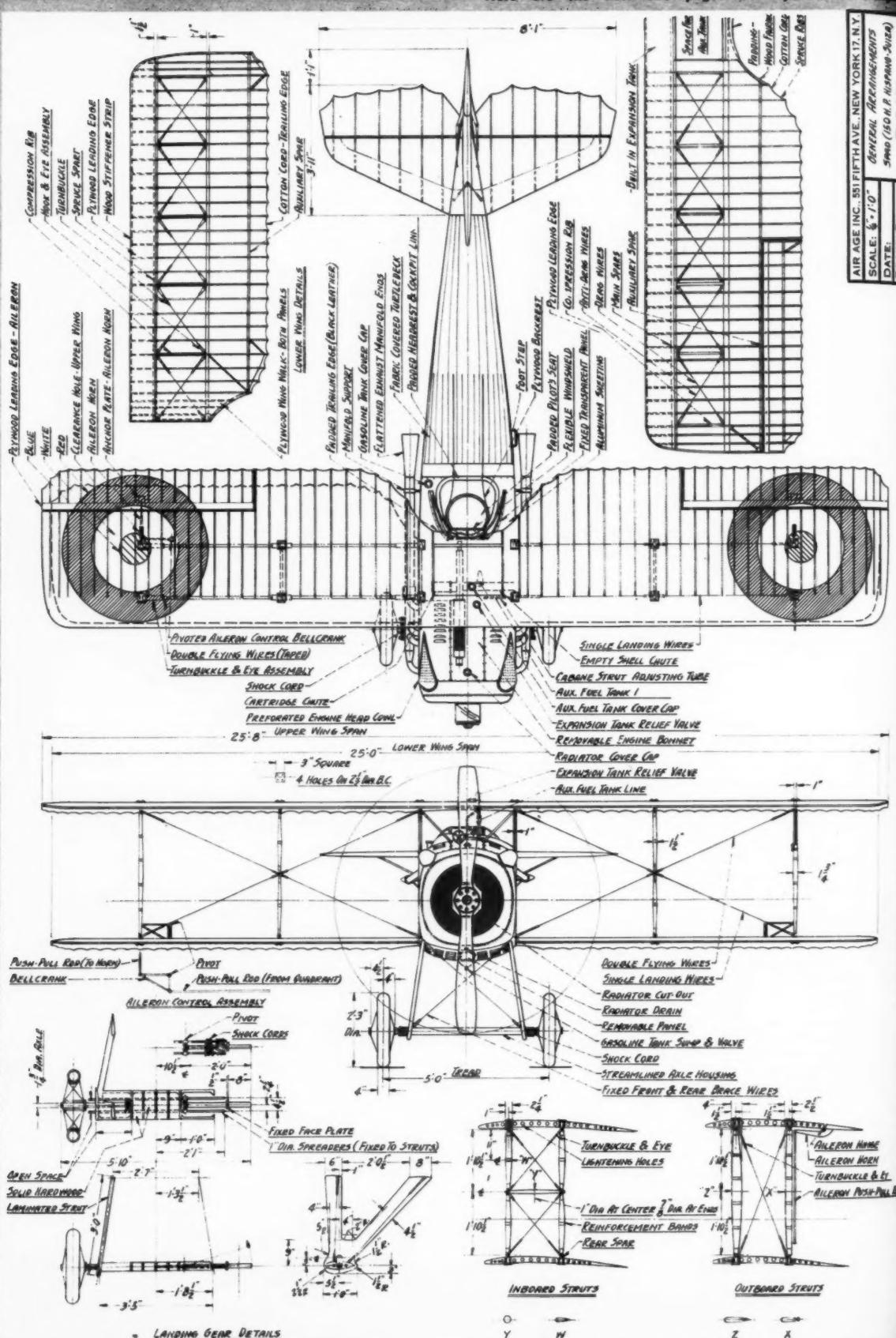
But streaking out of the maze of readjustment and reconversion aches and pains has come a comparative unknown-of, brand new 1946 design, and it packs all the war lessons into a meteor as new as this new year: the Culver V, victory in the war, victory in the battle for the lightplane lead!

When we say the *Culver V* is "new", don't think we aren't aware of you prewar MODEL AIRPLANE NEWS readers lurking around this page mumbling something about: "Yeah, guess he doesn't remember the prewar *Cadet*!" Well, take a look at the two of them lined up: the Model V and the *Cadet*. The V is "one shoulder wider", the landing gear is tricycle, the engine has 10 more hp and fuel injection, which eliminates the carburetor, the flaps are electrically operated, the range and speed are vastly increased—and if that isn't enough, it has an entirely new "Simpli-fly" control system that takes the guesswork out of flying and puts the V in the foolproof category.

This new control system is the most unique single feature of the *Model V*, almost a push-button flight method. In essence, it was created by connecting the flaps with the stabilizer in an effort to provide constant longitudinal trim. When the flaps of a conventional airplane are lowered a resulting "pitching moment," which acts to pull the plane over on its nose, is created. In order that the plane maintain level flight the pilot must pull back on the stick. Obviously, if, as the flaps come down the horizontal stabilizer simultaneously should come up, the pitching

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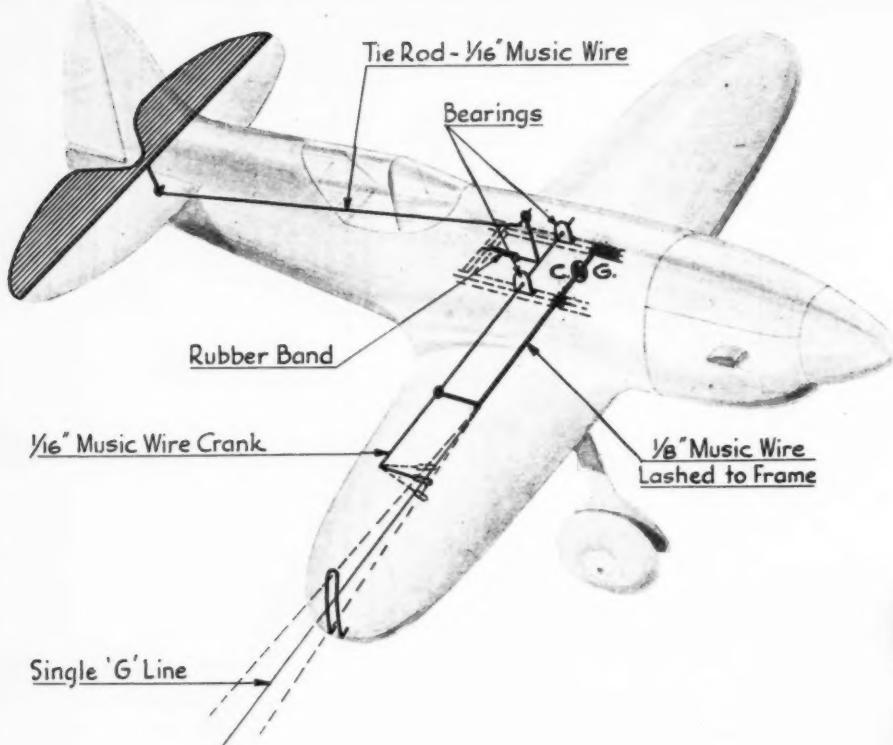


Fig. 1—A single line control system with movable elevator

Here are the answers to many questions the uninitiated may wish to know on the subject of control line flying

by J. S. LUCK

PART 1

FEW of the older enthusiasts have realized that there is an ever increasing flock of potential control line fans impatiently waiting to join the fold. These young men, many of whom have reached the right age group in the years since Pearl Harbor, would have become ardent followers before now were it not for a war-imposed shortage of material and a lack of constructive encouragement. Again, there are many who often thought of trying their hand at the game but regrettably stifled the urge pending study of a proper "primer."

In this article, calculated to satisfy both these groups, it will be assumed that the reader has little or no knowledge of tethered flying but is not necessarily without a little model-building experience. It is hoped that after the prospective control liner has read all that follows he shall be able unerringly to select from among the many published plans a model best suited to his abilities. He need never, in other words, "bite off more than he can chew in comfort."

There are really only two methods by which tethered models are flown, but so many refinements have been added to the original techniques that there now exists at least one practical means of retaining control over a model airplane which will appeal to almost any temperament and taste.

Through popular usage the term "tethered flying" has come to include all types of controlled or restrained flight, though originally it referred only to the tethering of a conventional free flight model by 35 feet or so of line to a stationary pole set in the middle of a smooth tract of ground. The ship was allowed to course around the pole under power and thus provided an ideal way of checking trim and general flight characteristics.

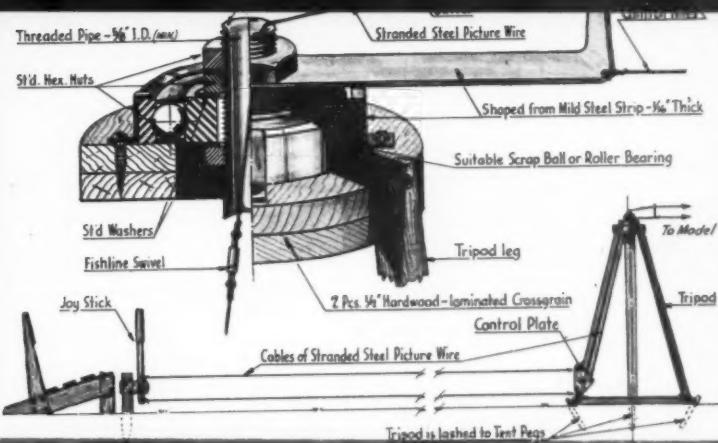
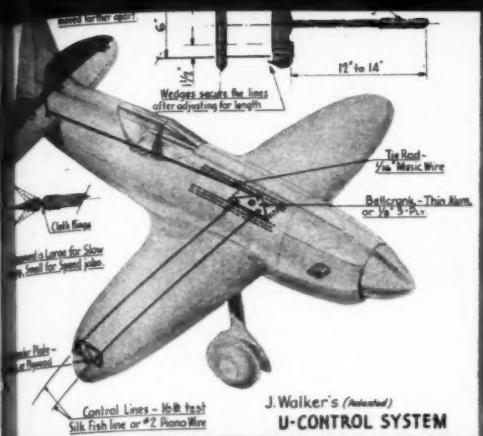
G-line control differs from the original conception of tethered flying only in one important respect—the added ability to direct the flight pattern in mild climbs and dives through the medium of a line between the wing tip (or other special anchor point) and the end of a fairly rigid fishpole, about 8' long, held in the hands of the pilot. If the model is correctly

adjusted for level flight it can safely be made to climb and dive as the tip of the pole is raised and lowered.

The usual G-line setup does not readily lend itself to sharp maneuvering because of an appreciable lag in answering an indicated pattern; but this rather unfortunate G-line feature was largely overcome by W. L. Barr who utilized the vertical travel of the control line to activate an elevator (with which a plane is then equipped) much in the same manner as in U-control (Fig 1). A model so fitted should respond quickly, and for this reason its application to pure speed models immediately suggests itself. With the drag of only one line to contend with, greater velocity is obviously attainable while it may still be possible to exercise some measure of positive and instantaneous control action so necessary to the successful flying and landing of high speed aircraft.

Although G-line models can be flown without any internal control mechanism, and usually are, the U-control ships are not quite so free of complexity. Without attempting to question the virtue of sim-

control
line
flying



plicity, however, it cannot be denied that the U-control system permits far greater opportunity to dazzle the spectators, and consequently most tether fans consider U-control flying a little superior to G-line.

The most popular form of U-control linkage (Jim Walker patent, Fig. 2) has been so frequently published in this magazine that detailed explanation of its operation is quite unnecessary. Other mechanisms, notably those supplied with the Victor Stanzel's V-Shark and the Eagle's Dreamer, vary the principle of Walker's original idea without appreciably affecting the result. *Shark* and *Dreamer* systems are both excellent but, because of the exacting parts they employ, are not so easily made with the facilities available to the average kitchen-table craftsman and are, therefore, best made commercially by the kit manufacturers.

Unlike G-line, the U-control models are directed by 2 lines which couple the elevator actuating bellcrank in the model to a short handle in the pilot's hand. The handle or "stick" is moved by wrist action alone and the controlling motions can be made with extreme delicacy or, if rare

occasion demands, with considerable vigor.

One variation of U-control flying which enjoys fair popularity is a comparatively new version of the original tethered flying idea. The model is tethered to a pylon, some 30' high, through which the U-control lines are connected to the model. The pilot remains outside the flight circle and maneuvers his ship by a regular joy stick. Cables from the stick to the pylon complete the setup (Fig. 3). Pylon flying has many advantages, but unfortunately it also has one serious drawback. If the lines should slacken the pilot cannot take the usual corrective measure, which consists of stepping back a few paces until tension is again felt; and this one objection is inclined to delegate pylon flying to a mere "fair weather" sport. However, given ideal conditions, it can give more all around pleasure than any other form of controlled flight.

In both U-control and G-line the senses of sight and feeling are concentrated on the model to the exclusion of all else, until there remains only a vague impression of general surroundings. The pilot visualizes his maneuvers by judging their relation to a greenish brown blur and

blue sky. Should he attempt to actually see details of the course as it flashes by the result would be either a crash, or dizziness, or both. On the other hand the pylon pilot can sit back in an armchair, if he wishes, and really appreciate the aerobatics he is performing; he becomes at once both spectator and pilot—a unique situation and a thrilling one. Because each lap is of constant radius from a stationary center, it is possible to cut the motor as well as lower flaps and landing gear by means of a feeler wire on the offside wing tip which may be tripped by a short stick placed directly in its path. (Inasmuch as the AMA seems to have outlawed jettisonable landing gears, there is much applause and credit due the first designer of a truly practical retracting undercarriage which will not only lower at the correct moment but be strong enough to take repeated landings.)

So much for the various methods, and now a little about the airplane itself.

The model first chosen should be slow. This does not mean fitting an Atom (no matter how "Mighty") to one of the super jobs with advertised speeds well in excess of 100 mph. To do so would give

(Turn to page 84)

Fig. 4—A simple control liner eminently suited for the beginner

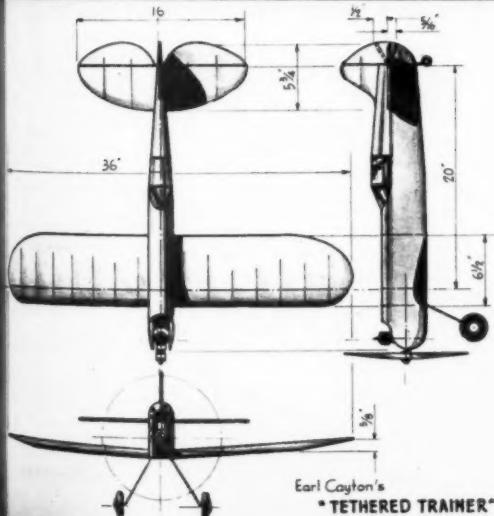
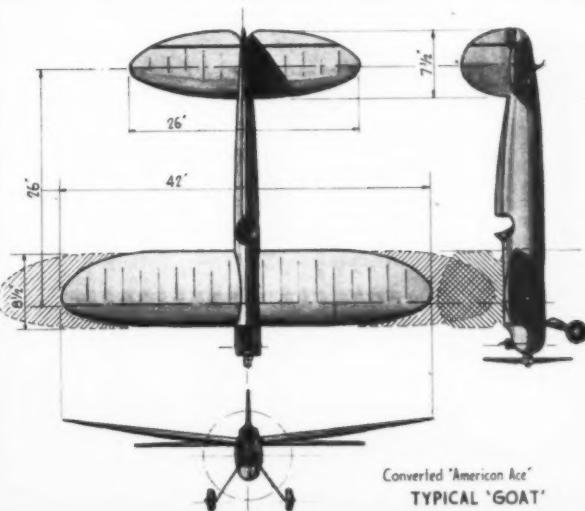


Fig. 5—Converting a free flight model to control work



LEADING EDGE $1/8 \times 3/16$

TIPS
 $1/8$

SPAR $1/16 \times 1/8$

R 6

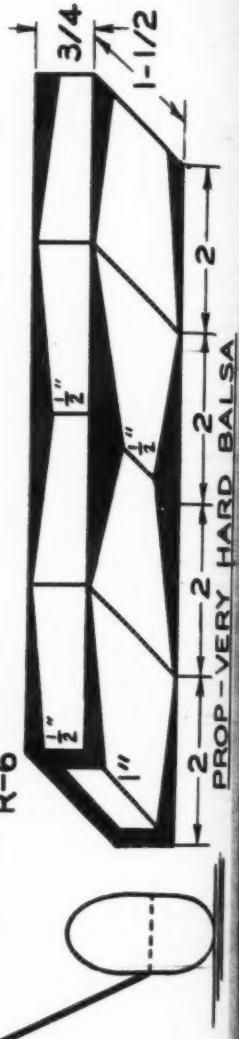
R 5 R 4 R 3 R 2 R 1

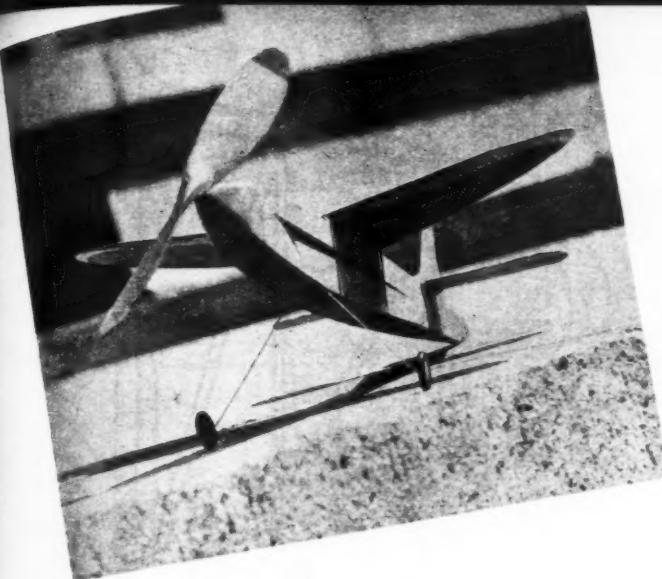
ALL RIBS $1/16$ SH'T

TYPICAL
FUSILAGE
CROSS-
SECTION

TRAILING EDGE
 $1/16 \times 1/4$

"Specie"





**Can't get a motor? Try this rubber powered
tether line speed demon for a real thrill**

MUCH talk has been heard about the speed of modern planes, and the idea occurred to me—why not streamline rubber models as well as gas for high speed flights. The resulting craft is shown herewith; clean, efficient and capable of developing speeds of 30 to 50 mph—or in comparison to real planes, from 840 to 1400 mph.

DESIGN THEORY—Speedie is a result of combining several features found in real planes. Probably the most outstanding is the rudder design which is derived directly from the Boeing B-17 bomber. The stabilizer is borrowed from the Short Sterling, long range British bomber, and proved to be very satisfactory.

The fuselage was made as simple as possible. The length is 3/4 of the wing-span. The landing gear was designed ruggedly to take the strain of landing at an angle of 30° at 50 mph, yet it does not burden the plane with excessive weight or drag.

The prop presented a real problem. It must be able to absorb the power produced by the motor and transform it into driving energy. The one I finally decided upon was a strong, thin, high pitch, two-bladed type.

The original model was made from balsa, but since weight is one of the less important factors in speed flying, successful models of pine can be built by using slightly lighter pine than is specified on the plans for balsa. The importance of strength and general workmanship cannot be stressed too much, so do your best and you will be rewarded with a beautiful model, both in appearance and performance.

CONSTRUCTION—The plans are drawn full size, so trace the structures on any handy paper. Cover the plans with waxed paper to prevent the glue from adhering to them. Make two fuselage sides at the same time, one atop the other, to insure congruity.

Lay down the 1/8" square hard balsa longerons and pin them securely in position. Then glue in place medium hard

uprights and diagonals. Allow these to dry overnight before removing from the workbench. Slice apart and glue in the 1/8" square crossbraces. The landing gear is bent from .034 in. diameter music wire which proved sufficiently strong. With thread, bind the gear to upright No. 3 and spread several coats of glue over the joint, allowing each to dry thoroughly. The rear rubber hanger is made of 2 pieces of 1/8" x 1/2" balsa cut to fit, with a 3/32" notch provided as indicated on the plans.

The wings should present no difficulty as they are built like most others. Be sure to sand the leading edge to blend in with the airfoil. The tail surfaces, although unique, are easily built using balsa sizes as noted on the plans. The hinges are made of 3/8" x 3/16" x 1/64" aluminum glued in place before the surfaces are covered. The nose and tail plugs are carved from a block of soft balsa. Trace the side and top view on the blocks and cut out on a jigsaw. Be sure to center the shaft hole in the nose block accurately because it is an important factor. Proceed to carve the blocks so they flow in with the lines of the fuselage. Leave a 1/8" notch around the nose block so it fits snugly in the fuselage.

The prop is carved from very hard balsa or soft basswood or pine. Using the dimensions on the plans, cut a blank and



'speedie'

center it exactly so it will run true. Carve it to an airfoil shape and sand to a smooth finish. Balance carefully, then slip a shaft bent of .034 music wire through the nose plug—through several 1/4" diameter washers and through the prop. Form a loop which is pulled back into the prop and glued securely.

The plane is now ready for covering and finishing. Sand all parts which will be in contact with the paper. Silkspan was used on the original because it is easily applied, especially around curves. It was fastened to the fuselage with a thin mixture of clear dope and cement. Entire sides of the fuselage can be covered at one time. Paper each half of the wing before the dihedral is put in. The bottom halves of the wing and also the stabilizer are covered first. Apply as many coats of thin clear dope as necessary to fill the pores. Then put on two coats of the final color. Sand lightly between coats to insure a smooth surface.

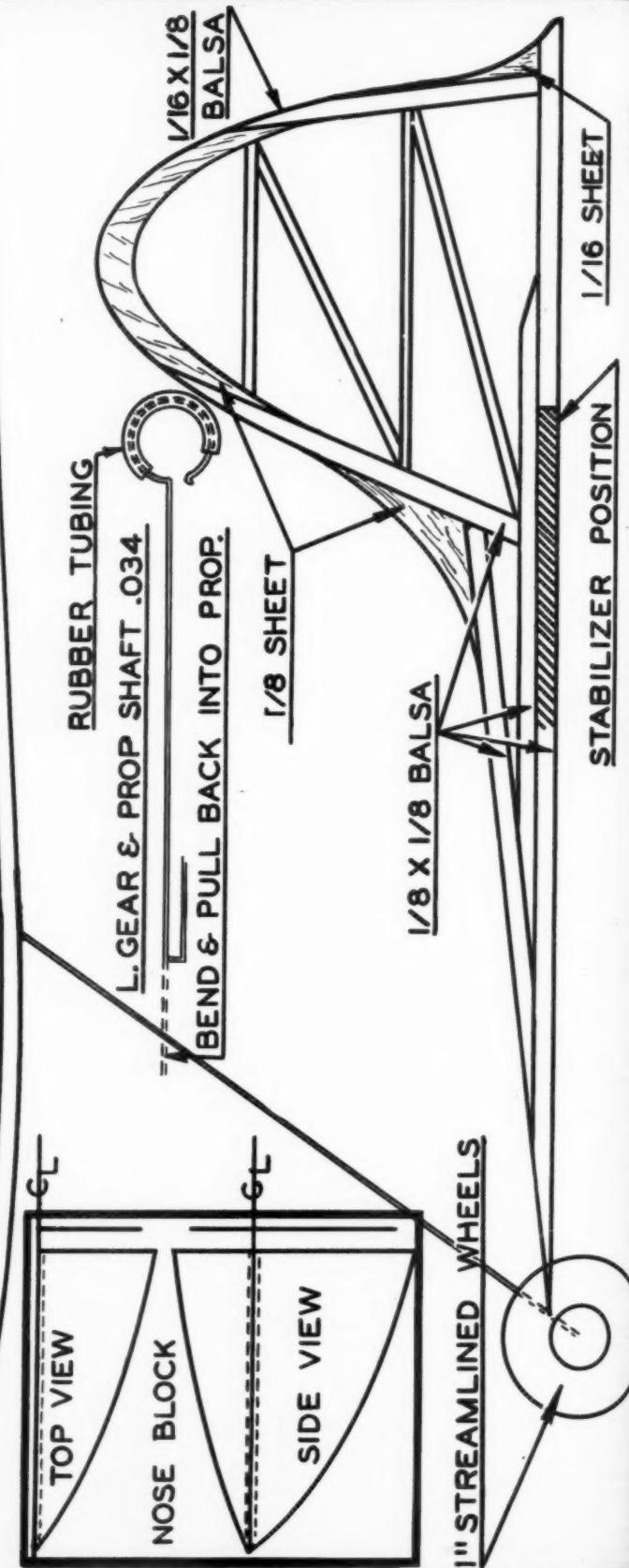
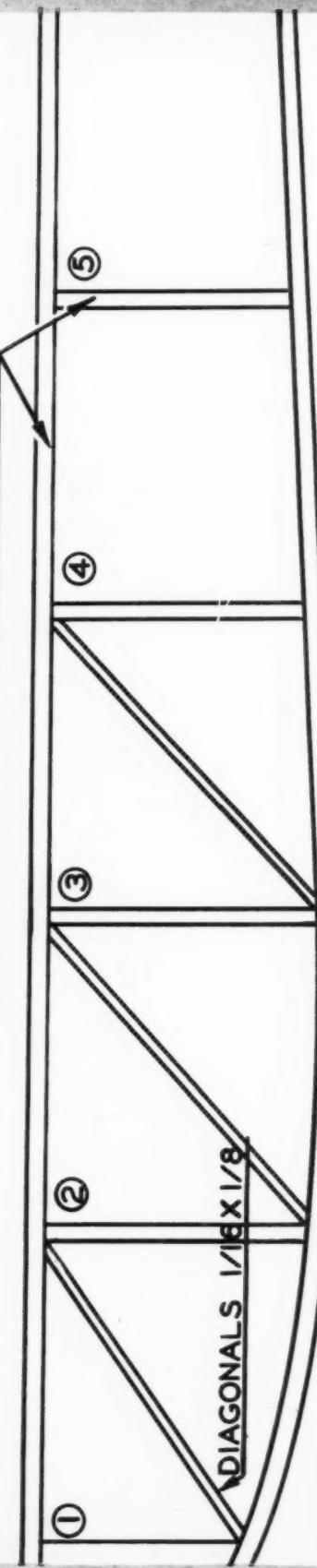
Assemble stab and rudder as shown on the plans before attaching to fuselage. Incorporate 1" dihedral in the wing and two 1/16" x 1/8" strips under rib No. 2 to enable the wing to set evenly on the fuselage. Glue tail assembly in its proper position on the fuselage.

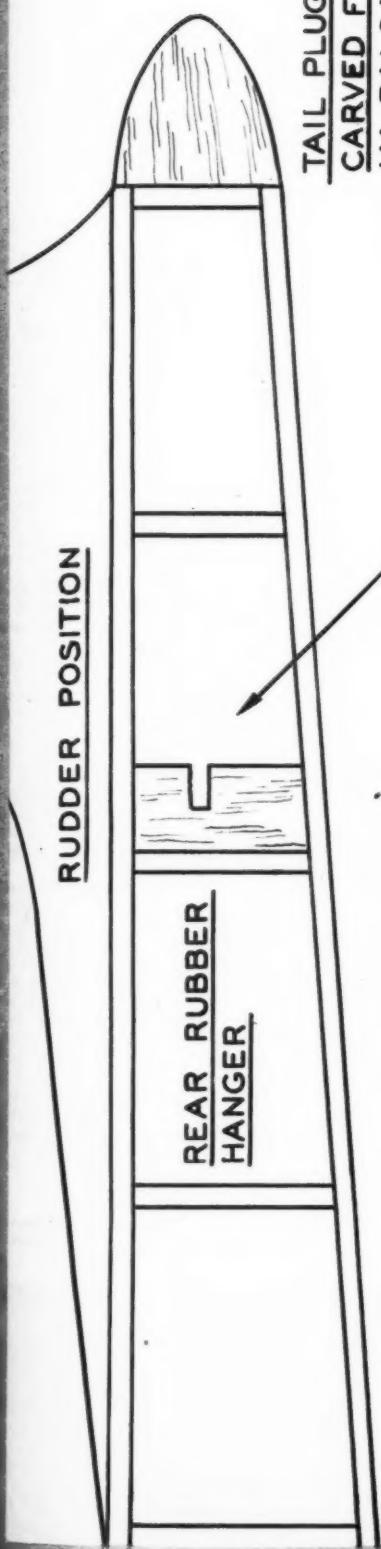
This concludes the building and assembly and we are now ready for flying. Attach the wing using a rubber band, with a 1/16" x 1/16" stick under the leading edge. Slip 8 strands of 1/8" flat rubber through the fuselage, anchoring it in the rear with a 3/32" diameter dowel. Test glide and adjust for a large circle to the left. The R. T. P. (Round the Pole) device consists only of a stick, such as a broom handle, stuck into the ground with a 15' length of string from the top to a pin glued on the leading edge of the left wing. Put about 100 turns in the motor and hand launch.

The propeller produces a terrific amount of torque so free flights are almost impossible. After the adjustments are taken care of, put in four more strands of rubber and watch out!

(Turn to page 56)

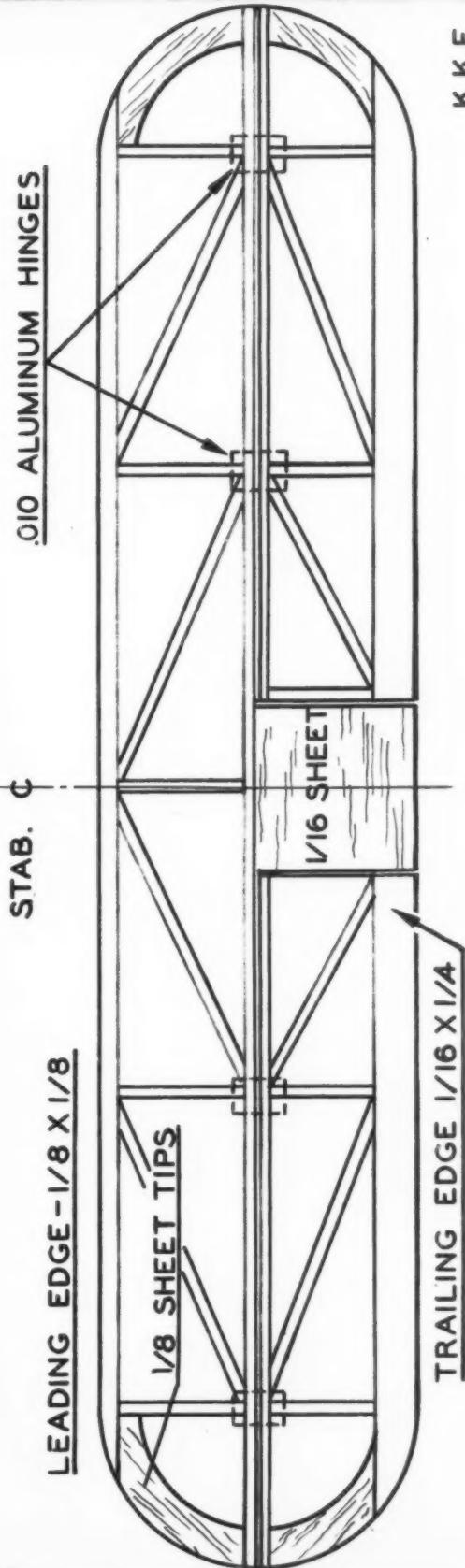
LONGERONS AND UPRIGHTS 1/8 X 1/8



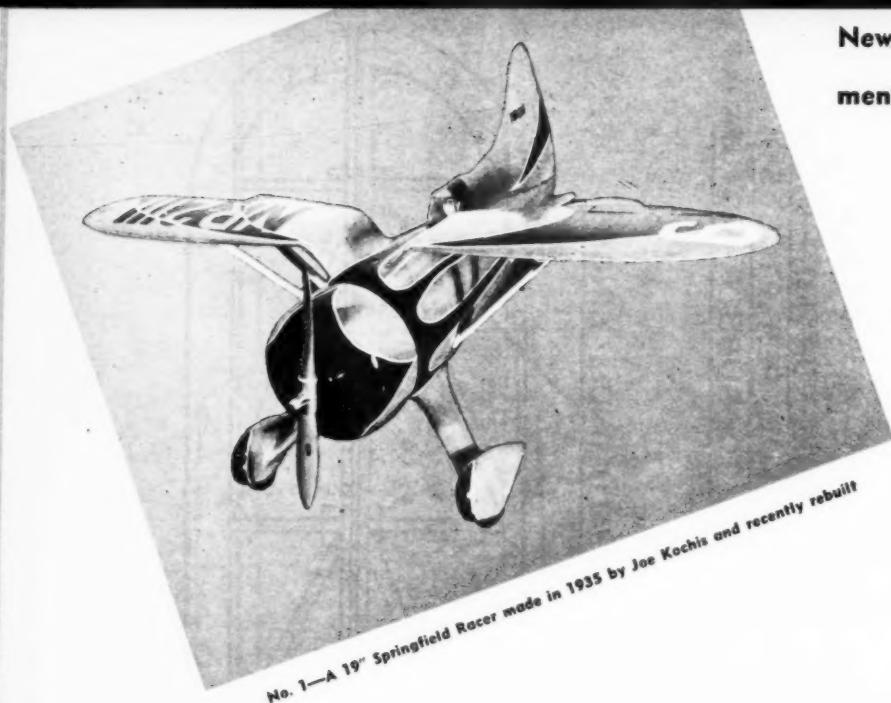


STAT.	1	2	3	4	5	6	7	8	9	10
WIDTH.	1-1/2	SAME AS STAT. #1	→		1/8	3/4	3/8	1/4		

FUSILAGE WIDTHS AT VARIOUS STATIONS OVERALL



air ways



THIS month we are going to talk about photographs—good ones, fair ones, but mostly poor ones. Naturally, we receive a great many photos out of which a dozen or so are selected for this page. However, at least half of those we get are of no use, for one or more of the reasons mentioned below. Not only the photos sent in for *Airways*, but also those for model articles are often of such poor quality that they are unusable.

Now before going further let us state that we know film and paper are scarce and often of doubtful quality. We know that cameras are hard to obtain. But, fellows, the surprising thing we notice is that more often than not the poor photos are the result not of inferior equipment but of "pilot error" on the part of the fellow running the camera!

By far the greatest percentage of photos are spoiled because the taker did not choose the proper background for the model. Not many of us have a live volcano as has Bill Foshag in Picture No. 3 on this page, but everyone has in his home the materials necessary to make a good background. Blankets of a solid color are good; and for dark colored models a plain white sheet is fine. These, of course, do not make what might be

called an artistic background but they do show up the details of the airplane, which of course is the main thing we are all after.

Many indeed are the shots we receive wherein a model is photographed against a brick wall, a bunch of flowers, or one in which a telegraph pole or tree sprouts out of the cockpit. Often pictures are sent in of a warplane model decorated with the latest idea in camouflage; unfortunately the camouflage is sometimes so good that the outlines of the model can only be guessed at. Obviously to show such a model up properly it should be taken against a plain solid background of such color that the model will stand out boldly. If no other suitable background is at hand the airplane can be suspended from a wire and photographed against the sky with the sun at the photographer's back.

Flight pictures are difficult and nearly always require the help of an assistant. Unless one possesses a camera with a really fast shutter even a gliding model is hard to "stop." The best way to do this is to follow the model as it sails by, swinging the camera to keep the ship centered in the viewfinder, and snapping the shutter at the most opportune mo-

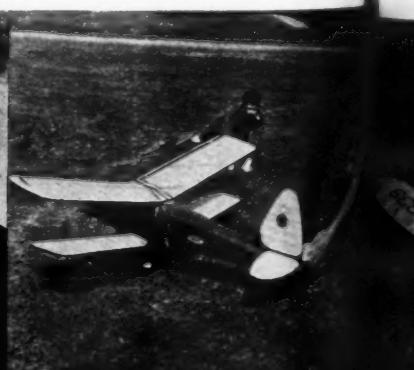
ment. This technique will result in a blurred background which however is of no consequence since the model itself will be clear and sharp. Also let it be emphasized here that pictures for publication can be quite small—it is not necessary to send in a shot where the model covers the entire print area. As long as the model itself is clear it can be enlarged as much as required for magazine use. While we don't cite it as the preferred case, we have enlarged pictures for *Airways* use where the model itself was only about 3/8" span but very sharp, thus producing a very satisfactory illustration.

Aside from poor backgrounds, the next great class of useless photos are those wherein the model is out of focus. Very often this results from trying to get close enough to the model so that it will fill the entire picture area. Unfortunately this almost always results in blurring the whole plane, or at the least that part closest to the lens. Most cameras cannot take a clear shot of an object closer than 3 ft., and it's safer to keep at least 4 ft. between the lens and the nearest part of the model. There is, however, an easy way to get closeups and this is by use of a portrait attachment. The latter is a

No. 2—Hurricane powered Fireball of G. Chirigos has 70 flights to its credit and more to come

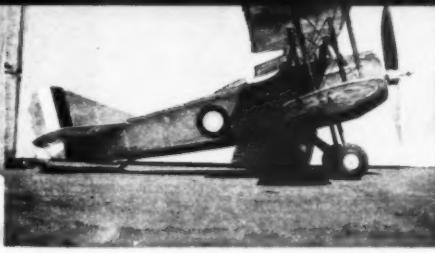
No. 3—Bill Foshag ready to launch glider in thermals at Paricutin volcano in Mexico

No. 4—Capt. S. T. Grant sends off Brown powered biplane for an interested audience

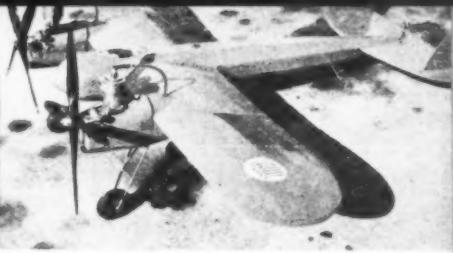




No. 12—Super detail Martin B-12 built by Robert Olson and complete in every detail



No. 11—Flying Spod 13 which John Homan says is a really fine performer



No. 10—Twin engine speedster of Lt. Com. Dillard has full throttle control

supplementary lens which slips over the main lens and alters the focal length. These attachments are low in cost and are available for all cameras, even the small box Brownies.

Regardless of what some of the "experts" say it is possible to get very good pictures with the cheapest cameras. It is simply a matter of watching the background, keeping the model far enough from the lens and using common sense in selecting the light direction.

So use care, fellows, and try to turn out pictures that do real justice to your models—not pictures for which you always have to apologize.

* * *

Joseph P. Kochis sent in Picture No. 1 of his Hall Springfield Racer which is 3/4" to the foot; wingspan is 19-1/2". At the time I was not experienced enough for filling in fuselage and adding fillets to gull stubs and landing gear. After gathering dust for nine years I decided to rebuild it and add the stuff I left out before." A good renovated job we think.

No. 2 was sent in by George Chirigos, 1425 Carmen Ave., Chicago 40, Ill. This Fireball was built in two weeks and is painted blue with a trimmng of black. George says: "The plane has 70 flights to its credit and boasts a beautiful glide. It is powered with a Hurricane 24 and has a speed of 56.3 mph with motor 1/6 open." George thought we might like to print it. Okay, George.

No. 3 was sent in by Bill Foshag. This glider was photographed just before soaring over the volcano "Paricutin" in Mexico where Bill lives with his geologist father. He says those interested in gliding should try the thermals in such a spot as they beat any he has ever seen. The glider has a 48" span and is 27" long.

Capt. S. T. Grant of Bournemouth, England, sent No. 4 showing his venerable 7' span biplane which weighs 5-3/4 lbs. and is powered by a Brown Jr. B. This ship is over 8 years old, and needless to say has covered much territory in its long

life. It is often used as the main unit of a composite setup, the upper portion of which is a small rubber powered monoplane. The latter is timed to separate from the biplane after the two are well up in the air, whereupon the monoplane travels off under its own power. Judging from the expression on the face of the small bystander in the rear the flights of this biplane are very popular indeed.

The Piper Cub Cruiser pictured in No. 5 was sent in by Joe Adams, 929 Russell St., Decatur, Ind. "It has many details," Joe says, "including built up motor, wheel parts, cockpit, movable elevators, etc., and took about two months to complete." Joe found some old copies of MODEL AIRPLANE NEWS and says he may decide to build the obsolete models and see if he can get another picture in Airways sometime. Well, Joe, keep trying.

The Canal Zone is represented in No. 6 sent in by Dick Swailes, Box 423, Cocoli, C.Z. His Thunderbolt is powered with an Ohlsson 60 and is made of balsa planked 1/8" thick on the fuselage and 1/16" on the wings. Dick took about 200 hours to build this ship and said he enjoyed each second. He was in the AAF for six years and is now working in the Zone doing defense work. He writes: "I've been building planes for 16 years and finally decided to take a picture of one and send it to you." Well, we liked it so we decided to let others see for themselves.

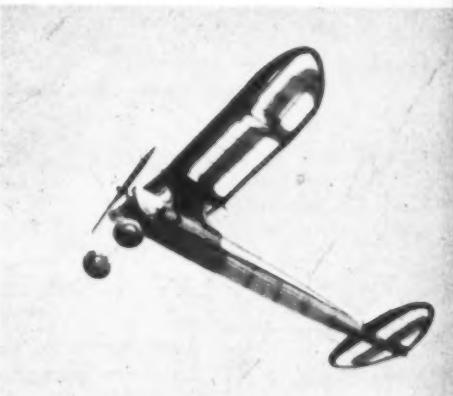
A naval lieutenant, M. W. Munk, sent us No. 7, an original design of Homer Gallie of 1463 Ingleside St., Jacksonville, Fla. Lt. Munk went to the Interstate Model Airplane meet at Jacksonville and saw a great many good fliers; he decided to photograph some and send them to us. The biplane we show has an Ohlsson 23 motor. Lt. Munk writes: "Although most of the photographs I took were of the 'also rans' the only explanation is that I shot what looked interesting to me during the running of the meet, without checking to see who was winning. Sometimes it seems that the ones

(Turn to page 66)

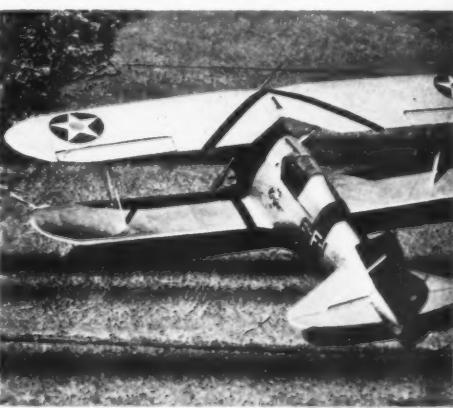
No. 5—Piper with much detail by Joe Adams who didn't say how it flies



No. 6—Control line Thunderbolt has Ohlsson 60 and was built by Dick Swailes



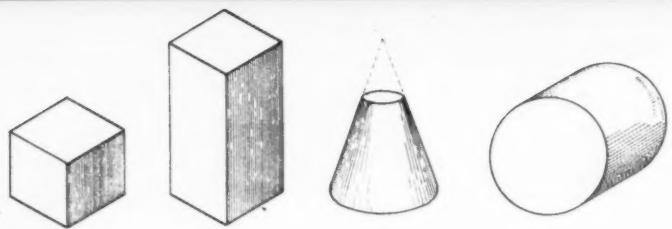
No. 9—Atom engined by original Eugene Parker has a flashy color scheme



No. 7—Slick control biplane by Homer Gallie; photo sent in by Lt. M. Munk



by WILLIS L. NYE



SQUARE DEVELOPED
INTO A CUBE

RECTANGULAR
ELEMENT

FRUSTRUM
(CONE)

CYLINDRICAL
ELEMENT

Fig. 1—Geometrical bodies of revolution

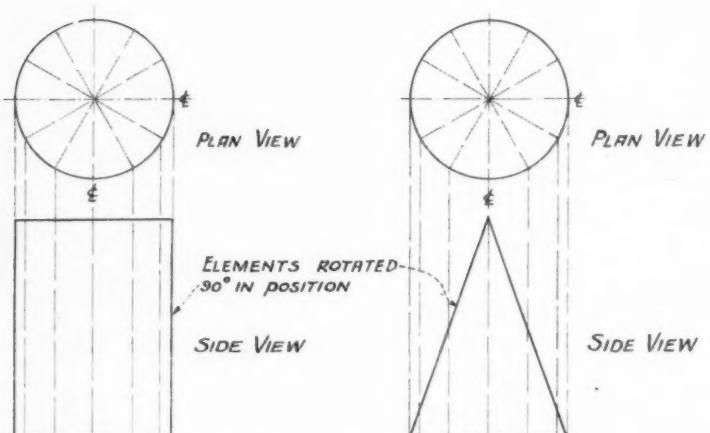


Fig. 2—Developments of bodies of revolutions

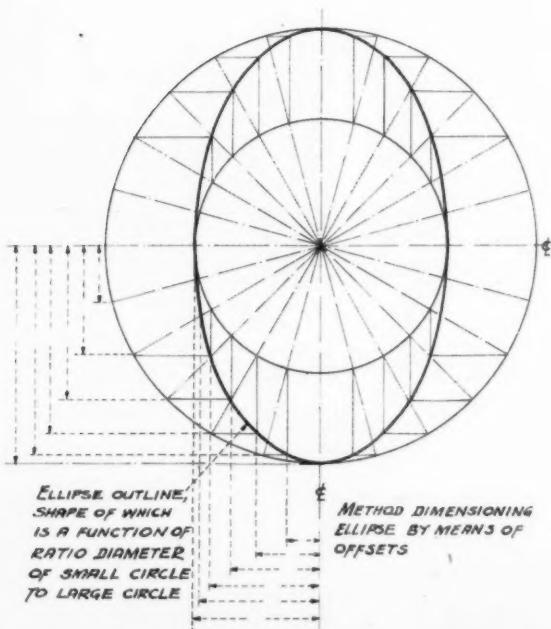


Fig. 3—Accurate construction of an ellipse

plane drafting

Further details on the application of plane geometry to model work

PART 5

GENERAL.—There are two basic geometrical elements from which model airplane fuselages are developed: the cylinder and the right cone. These basic elements were selected because they present less drag than other bodies of revolution. Other basic geometrical elements are also used which are modifications of the two primary elements, these being the circle, the square, the rectangle, and the frustrum cone. Examples of these appear in Fig. 1. In Fig. 2 are shown the basic projections of geometrical elements. All of these solids have a surface which when developed have single curved surfaces.

CIRCLES AND ELLIPSES—The cylinder is the geometrical element which is circular in crosssection; it is the simplest used in model airplane fuselage design. An ellipse is shown in Fig. 3. Note the method of construction. The ellipse presents less drag than any other crosssection except that of a circular body. Development of these crosssections into solids may be used as the basis for model airplane fuselage design. The intersection of other solids with these solids necessitates a development of these surfaces in the horizontal plane.

RIGHT CONES—Refer to Fig. 4. The surface of a right cone is developed by a straight line of which the vertex is centrally located with respect to the circumference of the circular base. The axis of the cone is perpendicular in all directions to the base. A straight line can be rotated about the vertex around the circumference on the circular base. All sections cut through the cone and which

are parallel to the base will be circular, and the centerline will be located on the same axis as that of the cone. In Fig. 4 is shown a right cone element which is part of the aft end of a model airplane fuselage. Circular structural members are normal to the fuselage centerline and can be made from a circular templet. A structural member of the fuselage which is canted as shown must be developed in accordance with the projection at the desired angle of the canted member.

OBLIQUE CONES—Refer to Fig. 5. The oblique cone is developed in a similar manner to that of the right cone. The axis of an oblique cone is not perpendicular to the circular base but is slanted as shown. Oblique cones are sometimes the basic geometrical element from which the aft end of a fuselage may be developed. Circular structural members are normal to the fuselage centerline and can be made from a circular templet. A structural member which is canted as shown must also be developed in accordance with the projection at the desired angle of the canted member.

FUSELAGE DEVELOPMENT FROM A RIGHT CONE—Refer to Fig. 6. Model airplane fuselages are frequently developed from circular cross sections of cylindrical elements as the basic geometrical element. In Fig. 6 is shown a typical model airplane fuselage wherein a circular skin covers an indeterminate space framework structure. Note that a cylindrical and a frustum element comprise the basic fuselage structure, and that a modified semifrustum comprises the fairing aft of the cockpit. Also note that the tail surfaces are modifications of triangular plane elements. The aft end of a fuselage is usually a faired conic element.

DEVELOPMENT OF A CONIC FAIRING ELEMENT—Refer to Fig. 7. Frequently during the course of model airplane design the use of a circular fuselage element is desirable. However, the fairing to the frustum element which comprises the aft end of the fuselage should be accomplished by fundamental geometrical methods. In this illustration the cross section of the fuselage is represented by a circle, which in this example is comparable to the base of a cone. This conic element will be attached to the frustum which comprises the aft end of a model airplane fuselage. Note that the right half of the circumference is divided into twelve equal parts. Project a horizontal line from each point on the right half of the circumference. Draw a vertical line which represents the transverse line wherein the fuselage fairing is to begin. The distance from the vertical line, or base, should be at least three times the diameter of the base in order to present good streamline characteristics. Divide the length of the conic fairing element into seven or more equal parts, this latter being a function of the division of the right half of the circumference of the circle. Draw in the upper and lower contours in order to complete the symmetrical conic fairing.

STRAIGHT LINES ON SINGLE CURVED SURFACES—It should be understood that in the development of a cylinder, a right cone, or an oblique cone, that a line drawn from the base of any of these elements to the vertex is a straight line, although it may lie on a curved surface.

(Part 6 will appear in the April issue.)

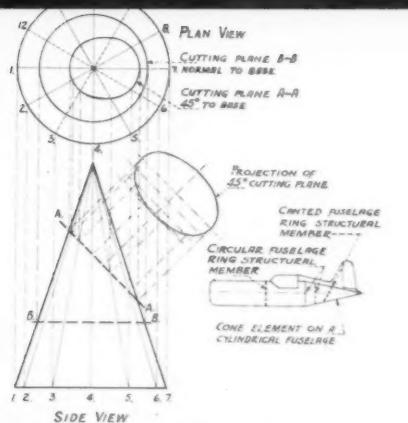


Fig. 4—Development of cutting plane relative to base

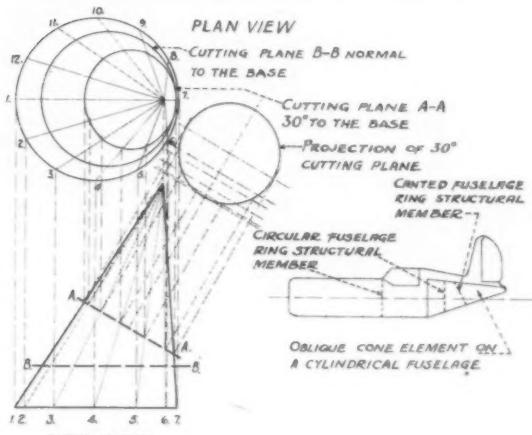


Fig. 5—Development as above but with oblique cone

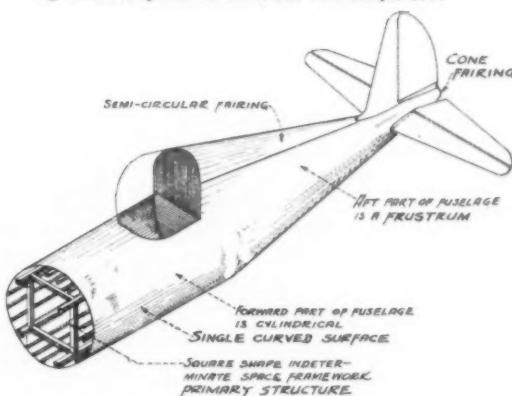


Fig. 6—Fuselage development from geometric elements

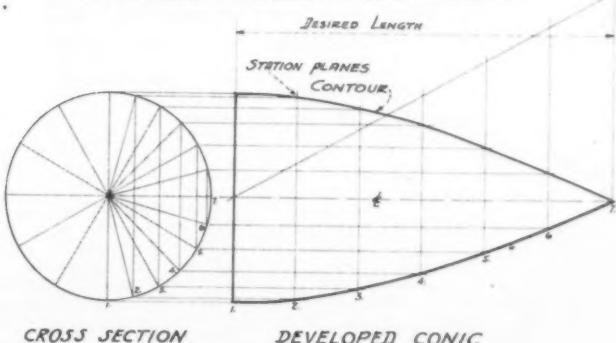


Fig. 7—Fuselage fairing developed from conical element

Here are some ideas of unusual design for the experimentally inclined builder

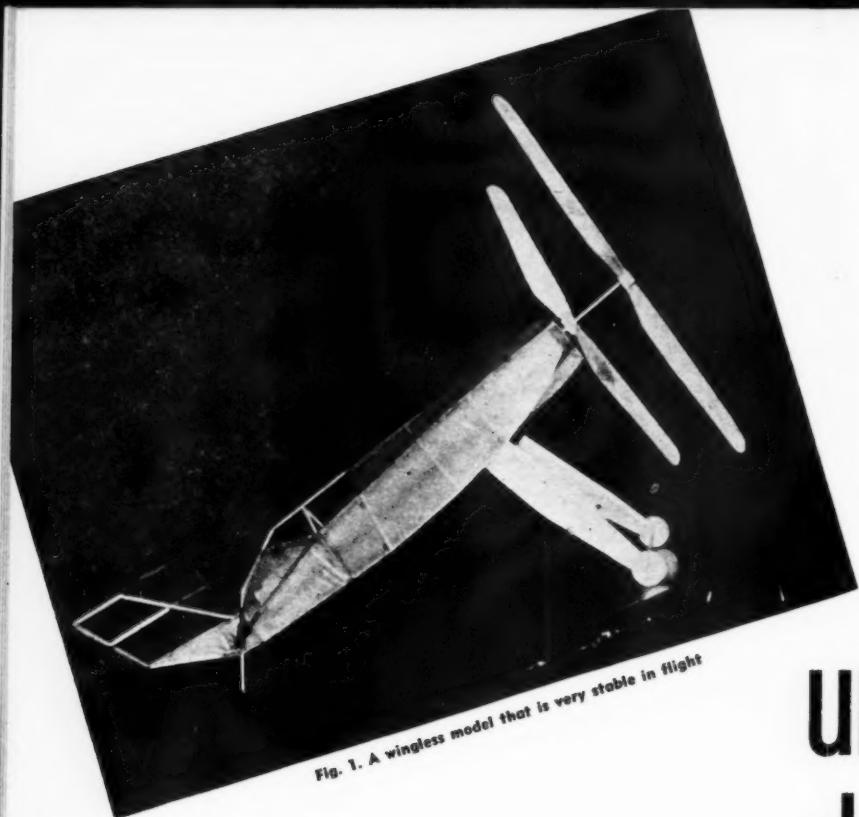


Fig. 1. A wingless model that is very stable in flight

unorthodox design

ONE of the very handy features of designing and building model aircraft is that these small machines permit the testing of unorthodox ideas with a minimum of expense and with no test pilot hazard.

There is, however, a pitfall which must be avoided in attempting to establish a prototype. This is due to "scale effect." A model can be made to fly by using proportionately far more power than would be tolerated in a full size aircraft (because in a model more power means just another rubberband or a "hotter" fuel mixture and not a serious engineering problem); therefore some check must be kept upon the performance of the non-conventional model in order that an accurate index of its efficiency may be established.

This may be done by comparing the performance of an experimental job with that of a model of conventional design. In making the comparison consider the amount of weight lifted, the speed attained, and the distance covered on a given amount of power. Because unorthodox design procedure frequently results in extremes, wing loadings and similar figures may not offer a good basis for comparison.

The acid test of any unorthodox design is: does it carry the same weight the same distance at the same speed on the same power as a conventional design; or barring that, does it exhibit some highly desirable characteristic impossible of attainment by conventional means?

Remember too that the basic soundness of the idea must be given a great deal of consideration. Ornithopters were among the first heavier-than-air models to fly, but because of the great amount of vibration attendant upon their operation it is highly unlikely that successful man-carrying machines will ever be built. Keep your model practical!

Let's take a look at a few unorthodox designs—if you are of the experimental turn of mind they may prove inspirational.

Fig. 1, the "Wingless Wonder," is a surprising looking creation dedicated to the proposition that wings are not necessarily a prerequisite to flight. This model flies very nicely in what would be a stall position in normal aircraft. It is very stable in flight and duration is quite good. It takes off and climbs in a fairly normal manner with its flight path flattening out as the rubber power runs down. Flight terminates in a free fall in the original but it would be fairly simple to secure a glide by incorporating folding wings in the design.

The principle of the model is: first, a source of thrust free of torque effect, which is obtained by means of a co-axial power supply unit (described in "Basic Design Problems of Model Helicopters," M.A.N., Sept. 1945); and second, a dihedral Vee stabilizer mounted at such an angle as to depress the tail of the model below the horizontal when under power.

This type of machine offers very interesting possibilities as a speed contest

competitor and with a little development might send current rubber power records crashing. There is practically no limit to the amount of power which can be packed into this type (consistent with its construction, naturally) as torque is no object.

Fig. 2 is a sailplane, but more than that—a sailplane with sails. This idea is not original to the writer and was tried on a full size machine some years back at Old Orchard Beach, Me. Such a machine is interesting from the "scotch ride" viewpoint, but contains a number of factors which are not immediately evident.

This 30" span glider attained surprisingly high speeds in a moderate breeze and could make crosswind flights of up to about 45°. Flights into the wind could not be made and the tacking principle could not be used except at extremely shallow angles. Although puzzling at first, the reason for this was finally doped out.

A sailboat, which has no trouble in tacking into the wind, has a keel or centerboard that is acted upon by the water when underway to provide a more or less solid fulcrum. The motion of the water and the motion of the air are distinct and separate. In an airborne craft, however, there is no comparable fulcrum.

Should one wish to be technical, it could be argued that if a speed considerably above that of the wind could be attained, the tail fin would act as a keel and make tacking possible. This may be true, but the practical consideration is that although airspeed may exceed wind-

speed when running before the wind, quartering immediately reduces this speed margin to a point where it is negligible.

In designing sail-powered gliders, which incidentally are a lot of fun if you don't mind chasing them, attention should be paid to a few salient points. Rudder area should be as small as possible, because large rudders tend to head a glider into the wind—an undesirable characteristic in planes of this type. The mast should be no longer than one-half the span to keep the CLA from going too high. Wing-section sails built up of light ribs and spars are far better than loose ones of cloth. A jib may help, but if it is too large it will make the model unstable in flight. The sail should be mounted free-swinging, otherwise a sudden change in wind might upset the machine.

Fig. 3 is an interesting type of gas model actually built by the writer. Although it probably resembles a blimp more than anything else it is actually a helicopter. The problem was to design a helicopter in which a model gas engine could be used without reduction gearing, contra-rotation or Sikorsky-style tail boom rotor.

The model was to represent a full size ship capable of speeds equal to those attained by conventional aircraft. Since no reduction gearing was to be used it was evident that some method of direct power application had to be worked out. From experience with small class A jobs it seemed reasonable to expect the Atom engine to be capable of direct lift with a margin of payload, small to be sure, but enough to take care of the airframe and accessories. Vertical bench tests with a Flo-Torque prop bore this out and further experiments with four blade high chord, low pitch props indicated a very ample margin of lift.

The problem of torque, always troublesome in direct lift aircraft, was solved by mounting the engine in a tunnel provided with internal fins to direct the airflow contrary to the engine torque. It required a bit of tinkering to get the correct settings on these fins but a satisfactory arrangement was worked out. Thus the unit became in effect a jet power plant, comparatively torque-free and designed to operate vertically. The fuselage of the ship was built up on ring formers with twelve $1/16'' \times 1/8''$ longerons. Covering this structure with tissue resulted in an extremely light and fairly strong airframe. A tail fin was provided but landing gear was omitted to save weight.

It was believed that sufficient gyroscopic forces would be set up in the rotor to maintain stability, but this developed a bit differently than had been expected.

"Flight" tests of the model, in which it was permitted to rise along a rod held in place by a ring guide with sufficient clearance to permit free floating, showed good lift with no torque effect but little stability. It was also established that the machine could be made to fly forward, back or sideways by blocking off a small section of the lower end of the tunnel on the side toward which progression was desired. The model was hand guided on several "flights" and from this it was learned that any sudden change of direction would cause it to roll over.

It would seem that if the stability problem could be overcome (and this might be done with fore and aft gyroscopes or side jets) a type of much promise could be developed. Of course sudden stoppages of the motor would result in immediate loss of lift and some sort of provision, (Turn to page 82)

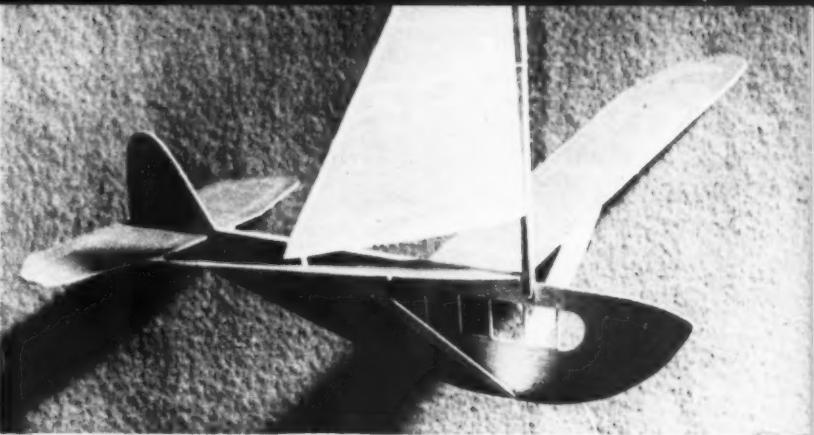


Fig. 2. Here is a true sailplane

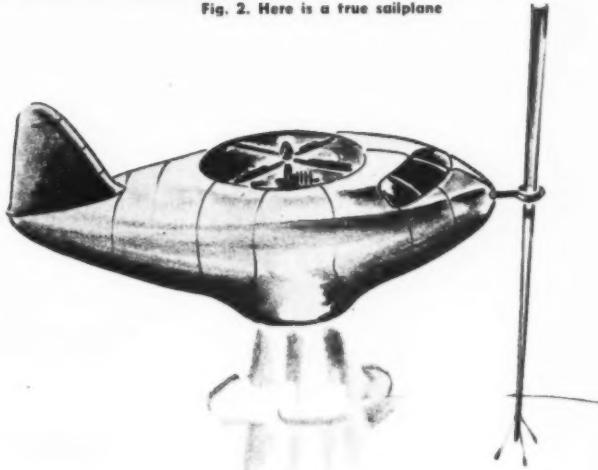


Fig. 3. A vertically flying gas model

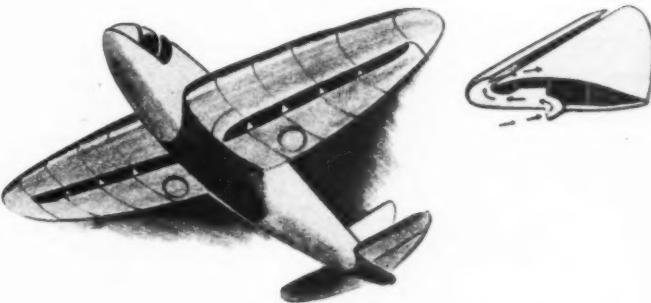


Fig. 4. Jet propulsion in the latest form



Fig. 5. Twin rotor gyroplane design

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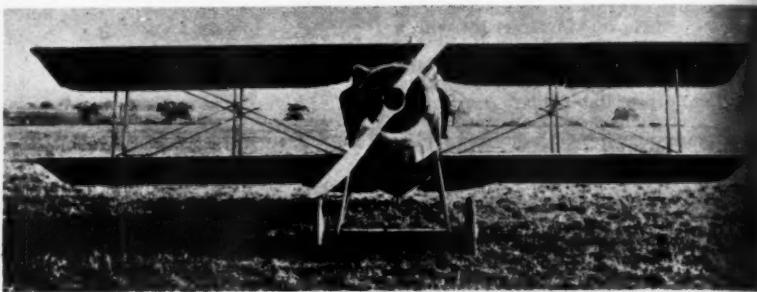
WHEN Armand Deperdussin and his aircraft manufacturing company "Societe Pour les Appareils Deperdussin" went bankrupt in the summer of 1914, it was in a way one of the best things ever to happen to French Aviation. This statement may seem strange, but the significance of the event can be appreciated when it is remembered that the result was the drawing together of three of the greatest engineering minds in the early history of French military aviation.

Youngest of the trio was M. Bechereau, youthful designer of Deperdussin's record-breaking racing monoplanes of 1912 and 1913. Most famous of the threesome was Louis Bleriot, famed Channel flyer and aerodynamic progressive. Equally illustrious, but in the field of European

automotives, was Marc Birkigt, brilliant designer of engines for the Hispano Suiza motor car company.

While this ultimate combination was something to come about a year later, the liquidation of Deperdussin's corporation prompted Bleriot to take over the firm's assets which consisted of land and buildings. The particular apple of Bleriot's eye was Bechereau, whose work the pioneer aviator had watched with interest and admiration. So, in August 1914, the month that saw the start of World War I, Bleriot formed the "Societe Pour Aviation et ses Derives," abbreviation of which became "SPAD."

Bechereau was made chief engineer with a free hand as far as designs were
(Turn to page 76)



Above we have a head-on view of the 180 hp Spad model S-7C.1



The second model Spad S-7C.1, powered by Hispano Suiza 8Ab engine of 180 hp



Third model Spad S-7C.1 powered by Hisso 8Ab engine fought for Allies to end of war

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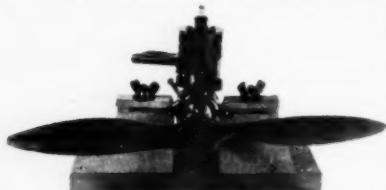
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British Navy's Sea Mosquito is torpedo bomber that differs from original Mosquito mainly in folding wings, arresting gear and specialized radar installation. Driven by 1635 hp Merlins, it has range of 1680 miles and speed of 380 mph



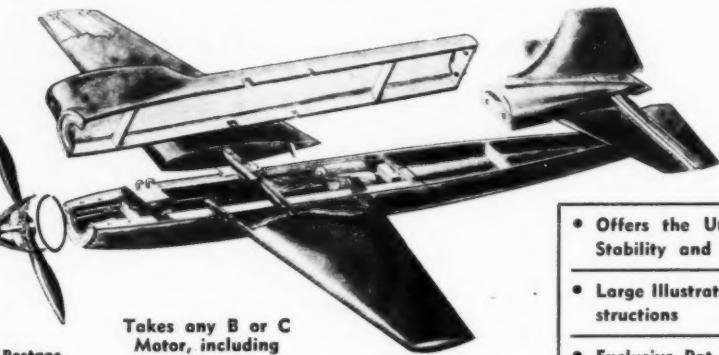
Navy experimental Fighter XF14C, built by Curtiss-Wright, never went into production. One of the first planes to use counter-rotating propellers the ship has turbo supercharger for high altitude work and armament of four 20 mm guns plus rockets and bombs

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GAS MODEL HINTS

by Ray Rusher

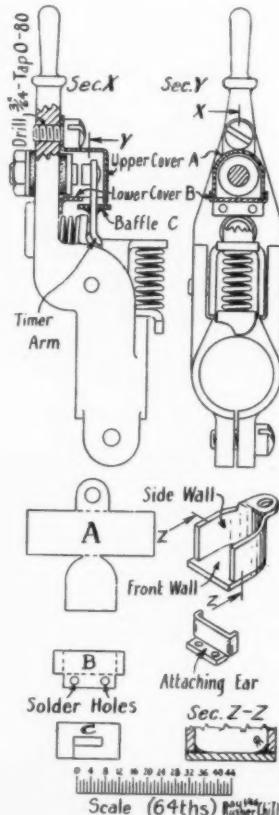
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(Turn to page 40)

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P-47N



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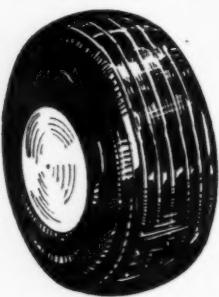
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described in January MODEL AIRPLANE NEWS. The drawing herewith shows a suitable point cover for an Atom and suggests how a similar cover may be made for the points of other engines.

The cover consists of pieces of tin A and B cut to the patterns shown and bent to the shape illustrated in the perspective view. The front wall is then soldered to the U-shaped side wall. This is best done by laying the upper cover on a piece of asbestos in the position shown in the perspective and "flowing" a drop or two of solder onto the front wall from a well heated soldering iron; be sure to get the cover heated to soldering temperature. The solder will readily flow across the front wall and into the joint between it and the lower edge of the side wall. If sufficient heat and solder are applied it will be found that the solder forms a perfect fillet as in the sectional view of the upper cover.

The timer bracket is tapped 0-80 to receive a screw to hold the upper cover in position. The lower cover is permanently installed by soldering it to the timer bracket. Clean the part of the bracket where solder is to be applied, apply flux and tin it. With the upper cover in position, hold the lower cover against it as in sectional views X and Y and flow solder into the holder holes of the attaching ear on the lower cover. Solder the oil baffle plate C to the timer arm to prevent oil, thrown outward by centrifugal force, from entering the cover.

The described arrangement permits ready removal of the upper cover for dressing the ignition points. It is hoped that this data will suggest how you can design a cover if your engine is not an Atom. One point might be mentioned: Don't make a cover to mount on the timer arm! It is desirable that the inertia and momentum of the arm be kept at a minimum. About all it will stand is the relatively small oil baffle plate illustrated without giving trouble during the higher operation speeds of the engine. As a final precaution—be sure the upper and lower covers clear the stationary timer point to prevent any possibility of a short circuit!

ROTO HANDLE FOR U-CONTROL

For Loops and Inverted Flying
by Ray Rusher

TO PREVENT control lines from twisting around each other and interfering with control action after several loops, here's a handle that can be made to rotate one revolution for each loop. To prevent crossed control action when flying inverted it can be made to rotate only one-half revolution.

The construction is obvious from the drawing. The shaft is 1/4" cold rolled steel or brass, and the tube is brass of about 5/16" outside diameter. The control line bar of 1/8" aluminum or brass is fastened in a slot in the shaft and the hand grip is secured to the tube as illustrated. The ratchet wheel is filed from brass (as is the ratchet bar) and is secured to the shaft by pinning or soldering; the ratchet bar is soldered to its rod.

In using the Roto-Handle fly your plane in the usual manner, making certain the lines are free of twist. After completing a loop depress the ratchet rod twice, with the thumb of the hand holding the Roto-Handle, and the control line bar will make a complete revolution. This removes the twist from the lines that result from execution of the loop.

When flying upside-down, first get the

(Turn to page 42)



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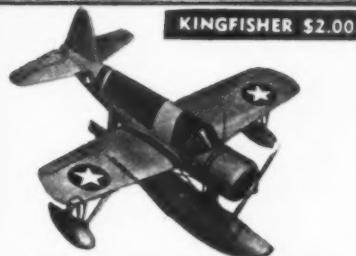
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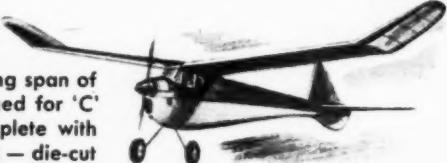


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*Pat. Pend.

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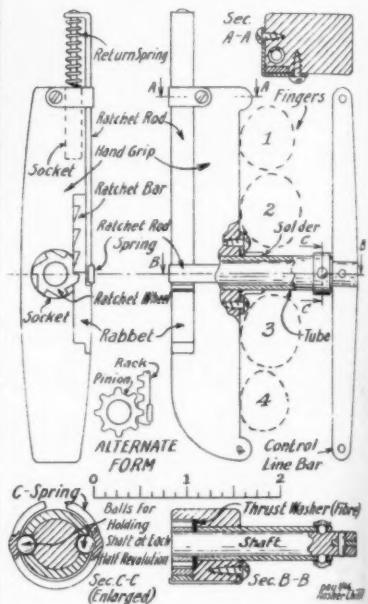


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plane into inverted position; then depress the rod and the result is the same as though the control handles were turned end-for-end in your hand so that control is natural and not "crossed." Now you can tip back on the hand grip for a climb and forward for a dive while the plane is inverted. When the plane is returned to right-side-up position, depress the ratchet rod again and the control line bar will return to normal position. After looping the plane there will be one twist in the lines that can be removed by depressing the rod twice and thereby rotating the control line bar one revolution; a vertical S, and return to right-side-up, will leave no twist in the lines.

The foregoing description and the drawing are for a Roto-Handle designed



for a plane that flies in the usual counter-clockwise circles with the control lines extending from the left wing. For a plane that flies clockwise, the ratchet action will have to be reversed. This can be done by reversing the ratchet wheel and locating the ratchet rod to the left of the wheel instead of to the right.

If you are interested in a somewhat simpler type of handle for inverted flying and letter S flying but not loops, the drawing shows an alternate form having merely a rack and pinion in place of the ratchet arrangement. Depression of the rack turns the control line bar clockwise one-half revolution, and release of thumb pressure permits the return spring to rotate the bar counter clockwise to the original position.

There is one important adjustment of the control lines that is necessary for successful operation of either type of Roto-Handle: a vertical position of the handle must correspond to level flight of the plane. The ratchet or rack mechanisms should then be operated only when flying the plane level either right side up or vice versa. The Roto-Handle must of course always be held right-side-up; the extending ratchet rod or rack serves to indicate the upper end.

Best wishes to you modelers in the construction and use of a Roto-Handle. Here's hoping you find it a real help in stunt flying and an aid in contests.

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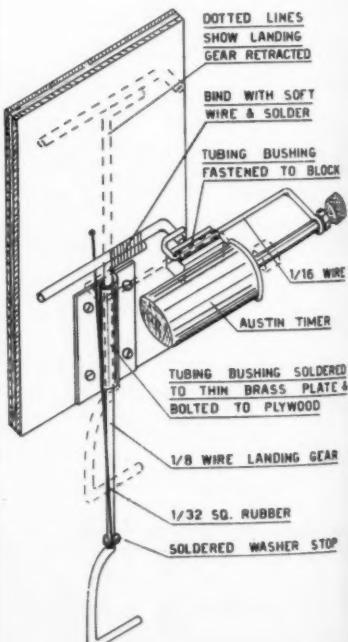
by Corp. Jerry Stoloff

FOR those fellows who go in for high performance contest models, this retractable landing gear will suit your needs to a "T". The mechanism shown in the drawing is very simple and easily constructed. The Austin timer which is used to control your motor run is also used to work the retractable landing gear. The model should never be glided with the wheel in the down position as it is likely to bend the landing gear and prevent it from sliding in its bearing.

To begin with, $\frac{1}{8}$ " plywood bulkhead is used for mounting the mechanism. A piece of $\frac{1}{8}$ " inside diameter tubing about 2" long makes up the main bearing and is soldered to a piece of thin sheet brass which has 4 holes drilled in it for mounting to the plywood bulkhead. Landing gear is bent to shape from $\frac{1}{8}$ " music wire. The top bar which is soldered to the main gear is also bent to shape and bound with soft wire. The bearing is bolted to the plywood bulkhead. A metal washer is soldered to lower part of the landing gear and used as a stop when the gear is retracted.

The Austin timer is fastened to a hard piece of $\frac{1}{4}$ " sheet balsa and inserted in the side of the model about 1" from the plywood bulkhead. Out of $\frac{1}{16}$ " music wire, bend to shape the fitting used to hold the landing gear in the down position when the timer is out. Be sure to slide on the wire a piece of $\frac{1}{16}$ " inside diameter tubing which is fastened to a block and acts as a bearing. The $\frac{1}{16}$ " wire fitting is then soldered to the timer arm a little below the locknut. The block holding the bushing is cemented firmly to the plywood bulkhead making sure the wire fitting slides easily through it. A piece of $1/32$ " sq. rubber is used to retract the landing gear as the timer moves in. The delay time before the landing gear retracts is determined by

(Turn to page 46)



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length of the 1/16" wire fitting which crosses the 1/8" wire gear.

A drop of oil is inserted in both the landing gear bearing and the timer wire bearing, allowing free movement without friction on both the moving parts. Too much tension cannot be used to retract the landing gear as it only creates friction between the sliding wires and causes erratic movements of the Austin.

Where a two-wheel, retractable landing gear is desired, the same arrangement with only slight modifications can be rigged up without much trouble.

Italian Diesel Engine

(Continued from page 16)

achieve the technical and commercial success that they still have today are the Giglio 2cc by Grazzini (Florence), and the Antares 4cc by Vantini (Padua).

The Antares 4cc has the following features: displacement .24 cu. in., 1/5 hp at approximately 5000 rpm with 14 in. prop of 7.75 in. pitch. Weight with prop app. 11.5 oz.; weight per hp less than 3.3 lb. A conventional engine with electrical ignition and of equal power would weigh more than 5 lb. per hp. It has the fuel tank mounted on rear of the crankcase, thereby giving added strength and aerodynamic streamlining. The carburetor intake is placed at the side. The fuel used is a mixture of paraffin, mineral oil, turpentine and sulphuric ether.

The Giglio 2cc has the following features: displacement .12 cu. in., compression ratio 14:1, weight 6.3 oz., power 1/10 hp at 5000-6000 rpm with an 11 in. prop of 4.75 in. pitch. It is a 2 cycle engine with two exhaust ports set at right angles to each other; this enables the piston to be made without a deflector. The cylinder, made from nickel chrome steel, has the head surrounded by aluminum fins attached to the cylinder by a normal screw thread. The head carries the mechanism for adjusting the compression of the combustion chamber. Such an adjustment is accomplished by means of the counter piston which is made of steel. The piston itself is steel and joins the connecting rod by a steel wrist pin. The connecting rod is of high resistance steel with anti-friction bearings of Liase-bronze. The engine crankshaft is made from welded nickel chrome steel in three pieces and revolves in two bearings of Liase-bronze. The crankcase of duralumin is composed of three pieces. The cylinder, counter piston and the piston are all lapped. The crankcase is gas tight. After various tests it has been found advisable to use the following mixture for fuel: crude oil or paraffin, 10 parts; mineral oil, 3 parts, and sulphuric ether, 10 parts. During tests this engine worked uninterruptedly for four hours at maximum speed.

Among the numerous and excellent engines of latest construction now for sale and currently available are the Movo D-2 and the Mancini Alfa 1.

The Movo D-2 went into mass production at the end of 1944 and has already distinguished itself in several competitions. The engine has been constructed exactly; the materials used are the best obtainable and the construction is by skilled workmen using specialized machinery. This engine satisfies the requirements of modelers for either flying models or ship models. The normal type has the fuel tank separated from the crankcase and a limited capacity of fuel,

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about .17 oz. allowing for approximately 1 minute of operation. This arrangement of the tank also allows the engine to be used with the cylinder inverted. Some of the features are: displacement .12 cu. in., total weight 4.2 oz., speed 5000 rpm with 7 in prop of 5.5 in. pitch, power 1/10-1/8 hp. The crankshaft is made from nickel chrome steel, crankcase from light alloy, cylinder, piston and counter piston of heat treated steel. Piston pin of high resistance steel, cylinder head of light cast alloy, connecting rod of anti-friction high strength stamped alloy, and carburetor of light cast alloy. The fuel tank is of spun aluminum or synthetic clear material (plexiglas or celluloid).

The Mancini Alfa 1 is the newest Italian engine built having been produced early this summer. I have visited Mancini's workshop and seen the production of this engine and actually believe it is one of the best types. It utilizes a cylinder sleeve and has a displacement of 1.08 cu. in., but develops more power and more rpm than the other engines of .12 cu. in. Materials are: cylinder, special heat treated steel; piston, nickel chrome steel; connecting rod, high resistance steel; crankshaft, nickel chrome steel. All moving parts run in anti-friction bearings. Specifications: bore .47 in.; stroke .66 in.; power 1/10 hp at 5000-5500 rpm; weight (without prop) 4.7 oz.

I would not have thought engines could change so much in so few years but here they have made a departure from convention. Most Italian modelers are using the diesel type and those with the electrical ignition are considered obsolete. This new trend which has imposed itself on the engine field, and the causes accounting for its acceptance, are so great that we can readily believe in the complete success of the diesel engine in model plane construction. There is little doubt that American firms will soon come out with this type engine for the modeler's use. Watch for its appearance.

This article was prepared with the aid and cooperation of George Bonsi, Managing Editor of *L'Aria*. Details and photographs by courtesy of: Graziani, Ventini, Movo and Mancini.)

Model Culver V

(Continued from page 15)

been disregarded altogether, which would be a pity, it should be temporarily tacked to the firewall in the same manner as the canopy and the cement allowed to set.

The entire fuselage is now finished with successively finer grades of garnet paper to a satin surface.

Construction of the wing is quite orthodox. Cut out all the ribs first and by laying each pair over the construction drawing locate and cut the slots for the spars. Pin the trailing edge and the lower 1/8" square leading edge spar over the layout and cement the ribs in place. Put in the remaining leading edge spars, and when thoroughly dry sheet the leading edge. Allow to dry while pinned down to prevent warping. Assemble the wing by inserting the 1/8" plywood spar and cementing firmly, secure the wing tips at the correct angle, add the gussets where indicated, and go over the polyhedral breaks in leading and trailing edges with several fairly thin coats of cement. The cap strips are added and the wing carefully sanded.

Make up the rear landing gear struts and bolt them to the 1/8" plywood spar. It is best to solder a piece of copper sheet to the strut in order to provide a suitable plate for bolting to the spar; also it has been found practical to use plenty of

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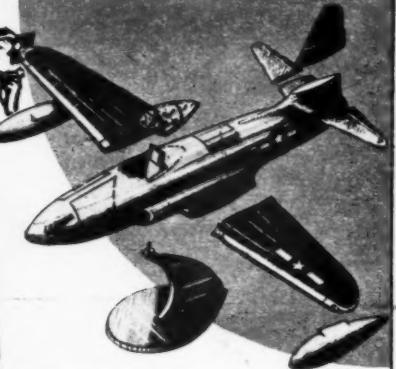
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Sculp-turned
Fuselages Nacelles Smooth As Silk!

SHOOTING STAR

- ULTRA-STREAMLINED
- PROP-LESS
- JET PROPELLED
- FIGHTER
- with the
- EXPLODED VIEW PLAN

Master Modelcraft brings you this outstanding addition to its famous line of "Sculp-turned" planes . . . Sculpture technique for realism . . . Wood turned for precision . . . All the hard work has been done for you on modern machine equipment. Finished "Sculp-turned" fuselage has complete wing and tail roots. Cockpit is shaped and finished. Cockpit canopy is formed plastic. The pedestal has been poised to give your plane the sensation of flight . . . The "Sculp-turned" way is the easiest way to build a perfect miniature . . . The "Shooting Star" will be a leader \$3.00 in your collection. The "Shooting Star" will make YOU a leader among your modeler friends.



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cement around the anchorage of strut and spar, not because you can hope to unite wood to metal but rather because the dried cement "keys" the two together. While the subject of landing gears is discussed, the front strut assembly may as well be completed although it would be better not to bolt it to the firewall until the fuselage has been completely finished; the protruding landing gear hampers the sanding and enamelling process. The front strut of 1/8" piano wire is made resilient by an integral "safety-pin" coil spring. To make the coil, the wire must first be annealed by heating to cherry red and allowing to cool slowly in air. The wire can then be easily coiled around a suitable mandrel of about 1/2" to 3/4" dia. After the remaining bends have been made to complete the strut it must be hardened and tempered by again heating to cherry red and plunging it immediately into cold water. Polish it with emery paper and hold it near the flame until the polished surface gradually changes color. As soon as the color becomes a light straw, quench in water again and the piano wire will once more be back to its original temper. This makes the most efficient type of "trike" gear and is well worth the trouble.

The wing is permanently cemented to the fuselage which has been cut out to receive it. Note that the leading edge is flush with the lower fuselage contour but that the trailing edge is 1/4" below it. Smooth in a small fillet of plastic wood between wing root and fuselage and set aside to dry.

Cover the wing with silk or Silkspan, apply two coats of clear wing dope and two or three coats of pigmented dope followed by whatever trim is desired. Give the fuselage two coats of primer (wood filler), sand each coat lightly and put on two coats of good grade enamel. The front cover suggests a very handsome color scheme.

Install the motor and the ignition components. The coil can be located in the bottom half of the fuselage while the canopy houses the batteries in whatever location balances the model at the indicated c.g. The cowling is only tacked to the firewall with a few drops of cement around its perimeter so that it may be pried off at any time with a knife blade. Hook up control lines and the model is ready for testing.

The ship will take motors from small "A"s to large "B"s. It was flown with an Atom but was then definitely underpowered; tried again with a Forster 29 she became a little too "hot" for sport flying. Probably the ideal then would be a powerplant of about 19 cu. in. displacement.

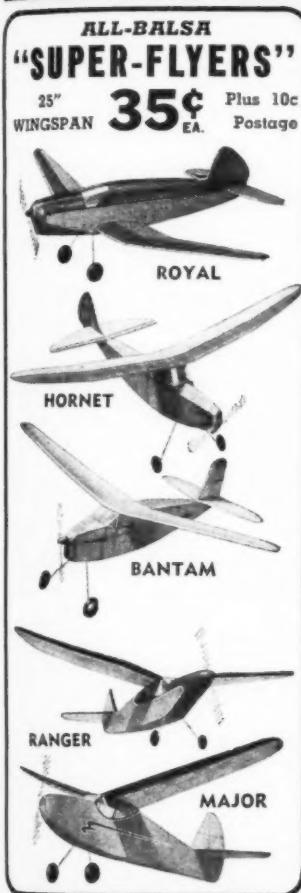
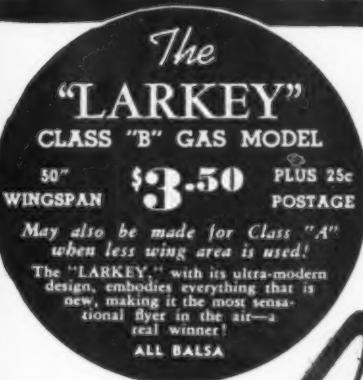
As no special idiosyncrasies developed during trials, nothing need be said about flying her; that is, provided this is not the reader's first control line model. Even if it is, a complete procedure for the novice to follow is the main subject of an article found elsewhere in this issue.

Best of flying may be expected from this miniature Culver; she'll never break a speed record, but with skillful piloting all the usual control line stunts are easily performed.

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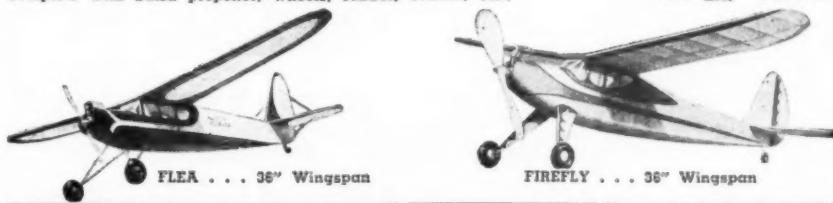


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Newsletter

(Continued from page 10)

model pioneers. You know the chaps we mean: the early birds of gas modeling, the fellows who had to figure out their own timer system and explain that gas modeling had nothing to do with the local gas and electric works. Among the eligibles for membership in this select little group would be members of the IGMAA—the good old International Gas Model Airplane Association, which was initially launched by MODEL AIRPLANE NEWS and Nathan Polk. Also qualified would be anyone who could prove he or she was a gasoleer back in the days of the first K-G and Zipper. It would be a league without dues, annual conferences or membership buttons. What we'd like to see is each oldtimer with a nice certificate suitable for framing, and for those still active a special emblem showing him to be one of the Fraternity to slap on his contest models. Early Bird Gas Modelers—it seems to us—should have "pet" AMA license numbers if they so desire and the numbers are open; certainly all should have as low a number as possible. Do we hear a motion, gentlemen? We leave the question up to the house.

Culver V

(Continued from page 19)

moment then is eliminated and no change in trim of the plane will result. Naturally this system cannot be designed to be fully automatic since, for example, the correct ratio for a slow landing would not be right for cruising.

To accommodate this difference, Culver's Chief Designer Al Mooney installed a "gear shift" in the Model V which consists of a flight control dial on the instrument panel. When you want to take off, you adjust this dial to the "takeoff" position and the flaps and stabilizer are adjusted to give the quickest, safest takeoff possible. After clearing the airport, the dial is set to "climb" and the ideal setting is obtained giving optimum climb characteristics. After reaching the desired altitude the dial is set to "cruise" and you settle down for the 7 hour flight possible in the Model V. Arriving at your destination the dial is set to "approach" and the flattest possible glide is obtained. Power is cut and the Culver drops slowly, neatly down on the runway.

Certainly this is automatic, foolproof flying of a new kind: Almost by push-button! Because of this unique feature the Model V actually has no elevator, only a small tail flap for those "hot pilots" who like to "iron out" and float onto the runway. The rudder isn't used in flight, believe it or not, and its greatest reason for existence is in taxiing around the airport. So without elevator or rudder, the Culver V is practically a one-control airplane; that's what designers have been shooting at for years! (And Al Mooney is now talking about using only one aileron instead of two!)

The main wing panel of the Model V is straight and the dihedral is placed in the small outer panels only. Although there are lengthy theoretical arguments for and against this system the Culver V has it simply for production reasons: it's easier to build it that way. The flap panel extends 70% of the wingspan and is of a special slotted design that "sucks" away the turbulent air around the wing.

(Turn to page 53)

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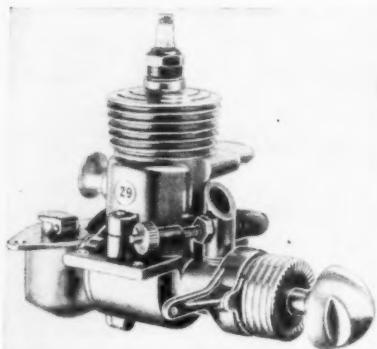
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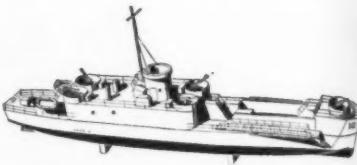
Class B GAS ENGINE



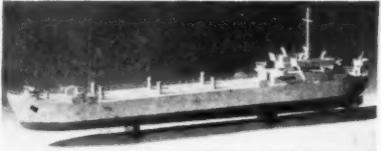
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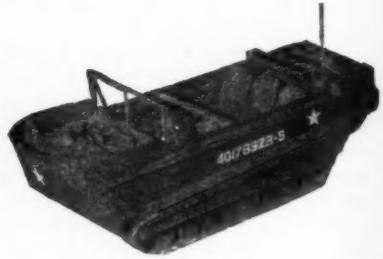
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fuselage joint which frequently causes severe tail buffeting.

Entrance to the two-place cabin is gained by raising the canopy forward and upward. The cabin is soundproofed and the Airfoam seats are adjustable. The baggage compartment (60 to 80 lbs.) is located forward of the cabin and behind the engine so that from the wing you can stow your bag and drop into your seat all in one easy movement. More space is available behind the seats for smaller articles.

The two fuel tanks are of Goodyear rubber-nylon composition and contain 35 gal. This gives the Model V a cruising range of 700 miles at speed of about 130 mph, fastest of any production type yet announced in this field. Regarding top speed, rate-of-climb, etc., Culver is not advertising performance figures until the Civil Aeronautics Authority has completed Approved Type tests on the prototype. But you can bet the new Model V will fly rings around the pre-war Cadet which was a racehorse in the air. This performance, incidentally, will be obtained for much less money due to the fuel injection feature of the Continental 85 hp engine, which produces the correct mixture automatically and eliminates the expensive fluctuations in mixture of the carburetor.

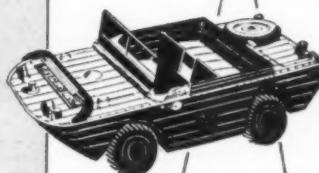
Culver Aircraft Corp., Wichita, Kans., has few if any reconversion problems because its assembly lines are geared to quantity production of the Model V and they'll be humming from the factory door early this spring. Changing to the Model V from war production was simple for Culver, for their wartime production was an almost identical model, the same in appearance but radically different in purpose. Culver was no newcomer to the job of supplying special aircraft for the war effort: such famous names as Luscombe, Monocoupe and Dart went into its engineering and production skills.

That skill began in May 1929 when Don A. Luscombe formed Mono-Aircraft Corp. in Moline, Ill. Under the capable hand of Chief Engineer Clayton Folkerts (later renowned for the racing planes bearing his name) the Monocoupe, Monocoach, Monoprep and Monosport models carried their names throughout the nation and pioneered comfort, speed and economy for the private flier.

But the depression of the early 'thirties proved too much for the young company. Luscombe sold his interests to Knight K. Culver and the firm name was changed to Dart Manufacturing Co. after the name of a promising design Mono-Aircraft had on the boards at the time. The firm was moved to Columbus, Ohio, and the Dart Model G went into production. In 1939 the firm again underwent difficulty and a new firm, Culver Aircraft Corp., was formed with K. K. Culver Jr. as Pres. and Al Mooney as Chief Engineer. The Culver Dart proved moderately successful and a later model, the Cadet, gained a wide sale particularly to experienced pilots who desired its high performance.

In August 1940 (16 months before Pearl Harbor) an event took place that changed the entire story of Culver Aircraft. Army Air Forces called representatives of all lightplane manufacturers to Wright Field to study plans for producing a radio controlled target airplane. More than a half dozen designers submitted proposals but when the bids were opened Culver was low, so low in fact that after winning the competition and receiving a contract for 75 airplanes in March 1944 the AAF raised the price \$400 per airplane to prevent the company from going broke!

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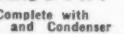
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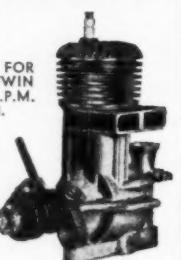
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The radio controlled target plane produced by Culver was designated PQ-4 and was something new in aerial warfare. The idea was simple: instead of student aerial gunners shooting at sleeve targets and other such unrealistic targets, the AAF conceived the idea of obtaining actual airplanes for such practice. (Subsequent experience has proved that no synthetic training aid ever creates the marksmanship that an actual airplane target does.)

It was obvious from the start that a real airplane, controlled from a distance by radio, could be flown in any attitude and height in simulated maneuvers against air and ground gunners. The next step was to work out the details and this is a complex, detailed story unto itself. Suffice it to say that this sort of pioneering was met with all the difficulties and setbacks of such untried, experimental work. The entire target plane program was carried out for four years under one of the most successful cloaks of secrecy in the war effort.

Late in 1941 venerable Walter Beech, of the firm bearing his name, acquired control of Culver and moved the firm to Wichita, Kans., near his own large plant. Here the tiny, secret planes rolled from the factory and were flown to equally secret testing grounds. First tests were carried out at Biggs Field, Ysleta, Texas, and later other groups were assigned to March Field, Riverside, Cal., and Elgin Field, Fla. But the heart of the work remained at Wright Field where continuous changes and improvements were made in the control system. The system consisted of a transmitting controlling unit on the ground and a receiving or "servo" unit in the plane. This servo selector unit operates a series of hydraulic pistons which actuate the plane's control surfaces. Numerous electrical systems were also required for the throttle, landing gear and brakes.

The Navy became interested in the program and arranged for half of Culver's production to be assigned to them. These Navy counterparts of the PQ-8 were designated TDC-1, 2, etc. A later, vastly improved model, was the PQ-14 (Navy TD2C), which is still in production for both services, one of the few military aircraft not cancelled on V-J Day. This new model has a 150 hp Franklin engine and numerous refinements in design and equipment. The PQ designation indicates that the plane is a "piloted" model, as distinguished from the QM models, which are gas models and not capable of carrying a pilot. "Piloted" does not mean that there are pilots in the PQ's when the guns open up! The pilot refers simply to a control plane having identical characteristics to those of the drone.

Stories of the PQ's are legend; tales of their having survived unbelievable hauls of explosive shells and still coming down in one piece; accounts of their flying out of the "line of sight" range of the UHF control set and continuing on their way across the desert to land in perfect shape more than 200 miles away. But on the serious side is the value of the radio controlled target plane in training our anti-aircraft crews to shoot accurately. First proof of the vision of this policy came in our North African operations when Yank gunners outpointed British ack-ack crews better than 2 to 1. Many proponents attribute the survival of the Anzio Beach group to the presence of radio controlled, target-trained, anti-aircraft gunners whose unerring aim soon drove the Luftwaffe from the area and confined the

(Turn to page 56)

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The new actuating roller increases the longitudinal stability so greatly that the natural yawing action and side-gusts of wind do not affect the ship. This improvement over the older type of elevator control aids not only stability, but permits greater accuracy and

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 (Fig. 2) Smith Firecracker mounted thru firewall with slot. (Fig. 3) Fibre strap used to mount coil on metal. (Fig. 4) Firecracker filed flat and mounted on fuselage wall or floor. (Do not use metal straps.) Any of these methods will give your coil a firm vibration-free anchorage ... the foundation for good ignition.

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Nazis to artillery fire for the last few weeks.

This, then, was the breeding ground of the *Culver V* with the thousands of ideas and tricks and engineering "know-how" developed on these highly specialized target planes congealed into a single design for the personal pilot of 1946. Culver is not compromising these technical advances in the interests of economy, and the *Model V* will not be a cut-rate, low-priced competitive design. Its present price tag reads \$3,750.

And just for the record, here's what's in store for the personal aircraft owner next year, the owner who wants to fly simply and safely. Mooney is serious when he talks of a one-control airplane, and here's why: when the ailerons of a conventional plane are set to turn it to the left (i.e. left aileron up, right aileron down) the right aileron produces more drag than the left, resulting in a force tending to turn the airplane to the right instead of left. Mooney's idea is an aileron on only one wing and an equal amount of area "washed out" on the other. Now with this arrangement of one aileron on the left wing, when the aileron is raised in order to turn to the left, the plane will roll instead of stall. When turning to the right, the left aileron will be dropped to neutral and the "wash out" of the right wing will pull the plane around to the right. This arrangement then puts the drag where it ought to be, on the wing you want to turn around.

Certainly there are amazing things in store for Mr. Flying America in this Air Age and we can certainly rest assured that a lot of them are going to come from *Culver*, pioneer in high speed personal aircraft, pioneer in radio control target plane design, and pioneer in many new things for a better, safer personal airplane of the future.

'Speedie'

(Continued from page 25)

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1-1/2 inch .034 music wire—for landing gear and prop shaft

14 feet 1/8" flat Para rubber—for rubber motor

Two 1" streamlined wheels—for landing gear

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Seven 1/8" washers—for prop bearing and landing gear

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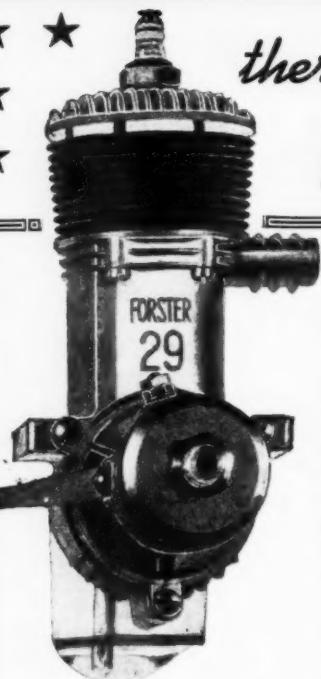
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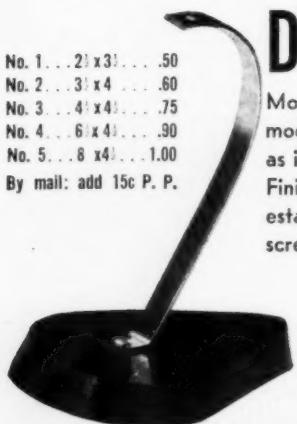
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DYNAMIC Pedestals!

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DEPT. A
2136 S. PULASKI ROAD
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Design Forum

(Continued from page 17)

position of its units, always check carefully on its balance, otherwise all its other virtues are useless. Pvt. Paivanas has not indicated the position of center of gravity; however, it is estimated that this point will be approximately over the pilot's seat as indicated on the plan view. Again the designer has performed his task well because a plane of this type must have the c.g. approximately in this position in order to balance correctly. The general rule is that c.g. should be slightly forward of a point which divides the distance between the two wings in a proportion inversely equal to the relative areas of the two wings.

Here we see that the front elevator is approximately 1/5 the wing area, so the distance of c.g. should be slightly forward of the point which is 1/6 the distance between elevator and wing, forward of the wing. In this case it is about 1/4 the distance and it is about right. This rule holds true for all Canard type airplanes and essentially this plane is of that type with tail surfaces added.

So we see that this plane is highly efficient in itself and that the control surfaces, both forward and rear, should make it highly maneuverable. However, there are certain characteristics which will detract from this maneuverability. This quality is not only dependent upon the area of control surfaces but also upon distribution of weights. Here we see that the weights are not centered but are located considerable distances from c.g. of the airplane; for instance, the heavy engine is placed in the nose well forward of c.g. The tail surfaces are well to the rear; even the wing weight is not centered but is to the rear. The long body also contributes to this disbursement of weight. As a result the inertia in maneuvers will be considerable.

This is a racing plane; consequently there will not be much call for maneuvering, straight line flight being the prime requisite. Nevertheless it is essential in racing planes to be able to turn quickly around pylons marking the course. Any one who has seen airplane racing will realize that if long wide turns are required much valuable time is lost. Many planes have lost races because of this condition.

Another requisite for high speed racing planes is light weight, because with less weight less wing area is required, with lowered resulting drag and higher speed.

Now we come to the second faulty point in this design. When an airplane has more units or parts than is absolutely required it is comparatively inefficient. Though this design is pleasing to look at, we are at a loss to understand the purpose of both elevator and tail surfaces. One without the other would give stability and control; together they give no apparent improvement in these two qualities or in efficiency; in fact they serve only to increase the amount of structure required, complicating the mechanism and increasing the weight. Therefore it will reduce the speed of this airplane as well as make it more costly. Greater efficiency would result, for instance, if the rear end of the fuselage were cut off completely so that the plane would include a small front lifting surface and a large rear wing. In this event, in order to create proper balance the position of engine and pilot would have to be changed. Either the engine and pilot could be moved rearward to bring c.g. in the right position or the pilot could be moved forward.

(Turn to page 60)

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MEGOW STRIP BALSA WOOD

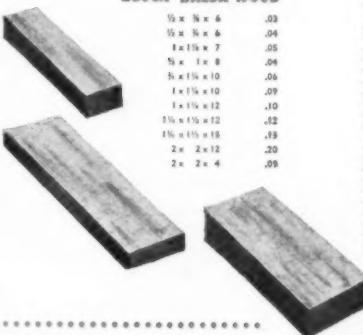
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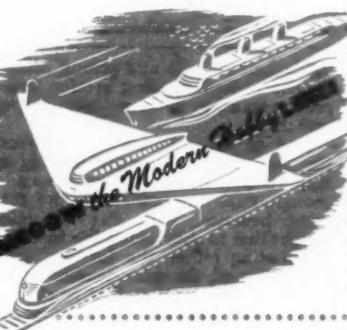
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She's a beauty, and a real record-breaker. Build her and add a proud new member to your growing air-fleet.

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ward and the engine placed in the rear driving a pusher propeller.

This arrangement would not only give proper balance but greater stability because Canard type planes are always more stable with pusher propellers. With the propeller in the rear, the nose of these planes seems to drop more quickly to recover the plane's balance when approaching a stall. This arrangement would result in reduction of weight to the amount of the rear part of the fuselage and tail surfaces. Complete longitudinal control could be obtained by use of the elevators in the small front wing.

Another possibility for improvement would be to eliminate the forward part of the fuselage and front wing. The remaining units of wing and tail would be entirely sufficient for stability and control. Efficiency would increase because of reduction in weight and less drag. In this type of plane both the engine and pilot would be moved rearward to give proper balance and the plane would assume the form of a normal tractor airplane. Consequently, we see the increased efficiency in this case will not result by added complication. It is far superior to design your airplane with the fewest possible units of the greatest simplicity. Efficiency then would result from lightest possible weight which involves cleverness

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in designing light and strong structures, a wise choice of wing section and correct proportion to give light weight and low drag.

One of the features not discussed is the flaps used to reduce landing speed. Apparently this is superfluous even though flaps are added to the forward wing because, with the reduction in weight due to shortening the fuselage and eliminating either the forward or rearward control, the wing loading would be so much lighter that this smaller plane would land without flaps at approximately the same speed as the larger with flaps. If flaps were added to the main wing of the small tractor type plane, then still lower landing speed could be attained.

Francis Morrow of 24 School Lane, Ardmore, Penna., sends a very excellent design for a sport plane shown on the first page of this article. In fact, it is a design which has been advocated by a number of flying sportsmen. Many of the present day lightplanes have comparatively poor visibility; most of them give vision forward and sideways and seldom upward and rear as well.

In this plane Mr. Morrow features a cabin providing vision in all directions except directly downward and through a small arc upward and to the rear. It is

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a great improvement over present types in this respect.

The second feature is its plywood structure. The fuselage, tail and wing are completely plywood covered, and he suggests impregnating it with some form of waterproofing and strengthening material. This type of construction is excellent, giving the plane great strength and making it possible to use a cantilever wing, thereby eliminating the struts reducing head resistance and drag with resulting higher speed.

It is a clean looking job in every respect and should give not only excellent performance but lasting service due to its sturdy but light construction. The general proportions are excellent yet there is room for some improvement.

It is noted that the propeller has excessive ground clearance. The propeller could be much closer to the ground without damaging results; and thus it would be an improvement to shorten the landing gear, lowering the front of the plane and thereby reducing weight and drag. It would also make it more convenient for the passengers to get in and out of the cabin. In lowering the forward part of the plane, however, the landing angle would necessarily be less with the tail wheel in the position shown. To attain

(Turn to page 62)

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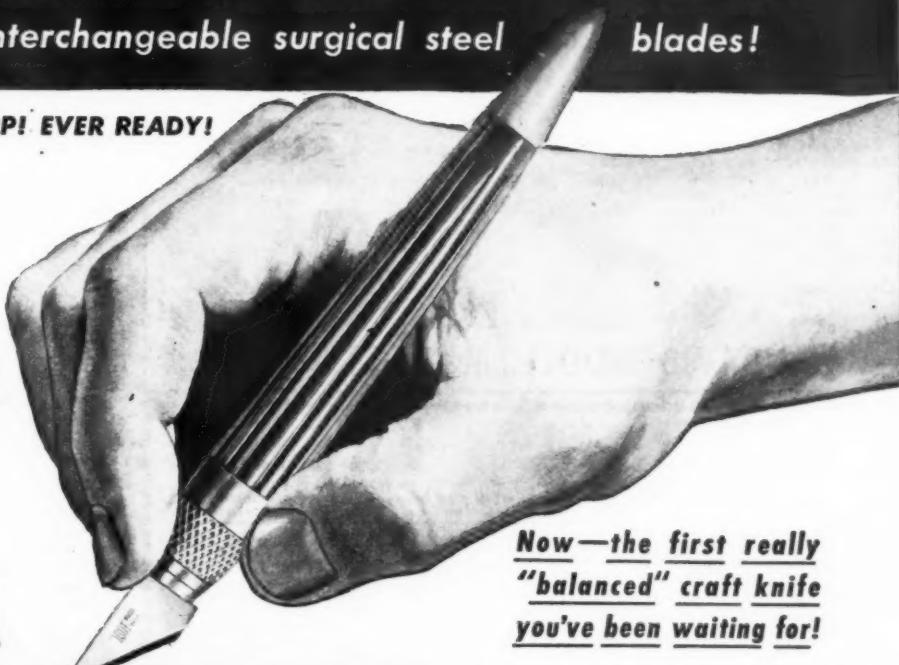
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maximum landing angle for the wing it is necessary to raise the tail. This can be done by carrying the upper line of the fuselage straight rearward from the lower rear point of the cabin. This would also improve the lines of the ship and slightly reduce the drag.

In its present position the fin is a little low, making the ship less susceptible to circling flight. In other words, to circle, this plane would require greater effort on the controls because with the fin low planes have a tendency to fly straighter than when they are in a more raised position. If the fin is excessively high the plane will have a tendency to turn sharply and possibly spiral, of course this over-sensitivity is to be avoided. Here it is a case of providing sufficient maneuverability and easy control without making the plane inherently unstable.

The only other possible criticism of this design is the position of the cabin door. It is essential that the door be placed between structural members. As shown one of the main wing struts bars the door entrance. We suggest the door be moved rearward to occupy the space between the two vertical struts supporting the wing.

Apparently Mr. Morrow's idea of a sport plane is a fast ship with comparatively heavy wing loading. This is what every sportsman would like to have. However, many also desire a low landing speed in the neighborhood of 35 mph. This plane would land comparatively fast, probably 50 mph or more. A little change in the basic design will make this low landing speed possible without reducing its other fine qualities of high speed and high wing loading. The latter is essential in order to make it air-worthy in rough weather. The only suggestion, therefore, is that flaps of proper design be added to this plane.

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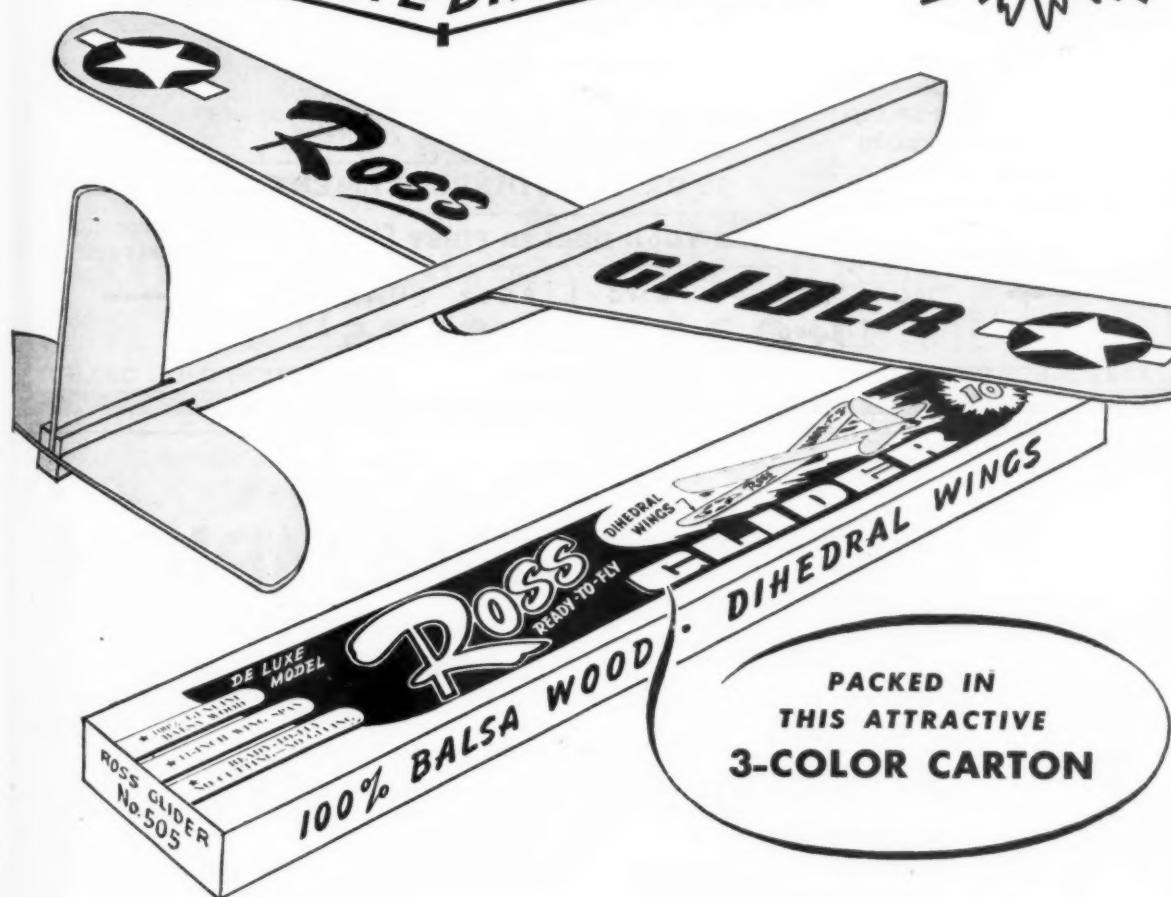
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Airways

(Continued from page 29)

who do not get their names on the prize lists are the more interesting subjects." We're inclined to agree with the Lt. after seeing a great many meets and discovering the same thing for ourselves.

No. 8 was sent in by George Hadley Jr., 1021 Ridge Ave., N.S., Pittsburgh, Pa. who writes: "I've been reading *Airways* for a long time and finally got up enough nerve to try and get my plane in the column." This highly detailed scale job has a dummy motor, movable controls, and instrument panel. It also has a 32" wingspan and is painted silver on the lower wing and underside of upper wings. The rudder is red, and top of the upper wing is yellow. It looks like a good flier, although George doesn't say anything about that in his letter to us. Does it fly well, George?

The Atom job submitted by Eugene Parker, 1251 Euclid Ave., Miami Beach, Fla., pictured in No. 9 is an original design. It has a 25" body and a 38" wing. The chord is 5-1/4" and the entire plane weighs 12 oz., the wing loading being 8-1/2 oz. Gene writes: I had much trouble trying to fly the model, the Atom being exceedingly hard to run inverted, but

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after many weeks of trying I finally succeeded in getting a few trial flights. I have now put the Atom in upright and altered the force arrangement which allows it to fly better. But it still isn't the best flier in the world." Well, it may not fly well, but the picture looked too good not to have printed in *Airways*.

The ship in No. 10 was made by Lt. Comdr. Walter C. Dillard, Murfreesboro, Ark. This twin engine design has a 42" wingspan, 34" length and 8" wing chord. The weight is 5-1/2 lbs. which Lt. Dillard says is rather heavy, "but the construction was necessarily heavy to withstand the weight and vibration of two engines. Experience has proven, however, that strength and weight could have been lessened in several places without ill effects. I think I could rebuild the plane bringing the weight down to 4 lbs. The wing and fuselage are planked construction with 3/8" poplar longerons in the fuselage for the main strength. The wing is constructed in 3 sections. The 16" center section, with 1/4" plywood forming 2/3 of the lower portion is attached to the fuselage longerons. This 5" x 16" section of plywood supports and gives the necessary strength for the motor mounts. The two motors used are Class C Rockets turning 12" propellers; they were placed

as close together as was possible and the propeller tips have only 1/2" clearance at the center and clear the fuselage nose by 1/2". Each motor is independent of the other. A central fuel system located in the fuselage was considered in the design but the idea was discarded in the belief that the inboard engine might starve due to centrifugal force at high speed. The ignition cells are located in the after end of the nacelles. The engine cowling and the nacelles are of .015" aluminum and are attached to the aluminum angle motor mounts by means of self-threading screws." This ship is one of the best we've seen in a long time and flies well, too.

No. 11 shows a Spad 13 sent in by John C. Hoffman, 615 Carbon St., Pottsville, Pa. "This model has a wingspan of 30," writes John. "All control surfaces are movable and gas model air wheels are used to insure better landings on rough ground, exhaust pipes being eliminated to lighten the model and thus have longer flights." John, just released from the Marine Corps after 4 long years, of which 33 months were spent in the Pacific, is just getting back to modeling again. He really hopes to do quite a few within the next months thus making up for lost time.

(Turn to page 68)

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Thermic 18"	\$.20	Commando 42"	\$ 1.29
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BOOKS

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Model Glider Design	1.50	Aviation Dictionary	3.50
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Extra Good Cement	3 oz. 25c	Paint	.90
3 oz. 25c		Ship Paint	.90
Dope—Most Colors, 3 oz. 25c		3 1/2" 25c	.75
Tissue—Most Colors, 12 for		1.00	
Bamboo Paper—Blue, Green, White, ea.		Rechargeable Booster	.10
Universal Coupling (State engine)		Rechargeable Battery	2.75
Control Wire (100 ft.)		Rechargeable Battery	2.75
Motorcycle Wire		Rechargeable Battery	2.75
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Paraffin Battery		Rechargeable Battery	2.75
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Ignition Special: Coil condenser, plug, extra washer, Batt. Box		Send for list of gas engines in stock	

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P47—Skyrocket	P38-Spitfire-Mitchell
B29—P40-P51-Typhoon	Heidivier-P61-Shooting Star
Cadet B29	
Helicopter—Bobcat	B29
Autogiro—Constellation	79c & 1.75
Flying Fort	P38-B29

Master Solids—\$1.00 each	
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Messerschmitt—Avenger	B17-B25-Douglas B19-Hellcat
P47—Skyrocket	P38-Spitfire-Mitchell
B29—P40-P51-Typhoon	Heidivier-P61-Shooting Star
Cadet B29	
Helicopter—Bobcat	B29
Autogiro—Constellation	79c & 1.75
Flying Fort	P38-B29

Super Solids—\$1.50 each	
Mosquito	B25 Mitchell
Douglas Boston	Wildcat
Marauder	P47
	P61
	Tiger Cat

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Wildcat	Hawker
Focke-Wulf	Gloster
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Warhawk	Airacobra
Messerschmitt	Martin-Balt.
Boulton	Spitfire
Lockheed Hud.	Superfortress

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B17	7.50

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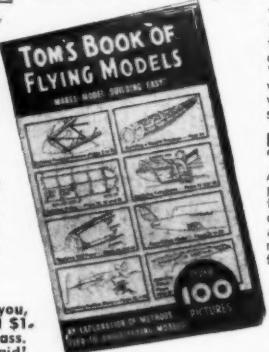
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We'll be looking forward to seeing some of these ships.

The Martin B-12 sent in by Robert Olson, 13 Oak Grove St., Manchester, Conn., and pictured in No. 12 is a patrol bomber now obsolete. Bob writes: "It took me 200 hours to build. The fuselage is built up and 'filled in' between the stringers with 3/32" sheet balsa. The front and rear cockpits are complete in details including bucket seats, safety belts, instrument panels, control column, etc. The cylinders on the engine were made from 3/64" flat pieces of wood, wrapped with thread and glued on the face of the carved motor front. The scale propellers were carved from hardwood and painted aluminum. All control surfaces are movable."

Brian C. Ruscoe, 26 Waiatarua Rd., Remuera, Auckland, SE.2, New Zealand, has asked that we tell our readers he'd like corresponding with them. He isn't choosy and would like writing to all modelers whether men, women, girls or boys.

CLUB NEWS

Arkansas

George Beal wrote us about a club he and his friends formed in Fort Smith. They call themselves the Thermal Thumpers and elected Russel Franz as Pres., Albert Bright, Vice-Pres. For more information write George at 1417 No. 36th St., Fort Smith.

Arkansas's first control line contest was held December 2, 1945. The results were:

Class C—(1) Bill Selby; (2) Tommy Jones.
Class B—(1) H. A. Thomas; (2) Charles Branson.
Class A—(1) Price Roark.

These contests are sponsored by the Little Rock Recreational Department under William K. Amo's direction. They plan holding one contest the first Sunday of each month. Anyone in the state of Arkansas is eligible.

California

The Air Foilers of Oakland hold their meetings the third Thursday of each month at 1636—18th Ave., Oakland. Everyone is welcome.

The first meet of the Alameda Bay Aero Modelers held Nov. 14th at Washington Park came up with these results:

Speed Event, Class A—(1) Ken Skilling; (2) Mel Anderson; (3) W. E. Shackleford.

Speed Event, Class B—(1) Dave Parks; (2) Bill Davis; (3) H. R. Anderson.

Speed Event, Class C—(1) J. W. Little; (2) Al Clark; (3) C. W. Mathews.

Speed Event, Jr.—(1) Don Ruark; (2) Charles Hallum.

Maneuverability, Class A—(1) A. Greene; (2) W. S. Biscay; (3) Don Holfelder.

Maneuverability, Class B—(1) W. Mathews; (2) Bob Hauff; (3) Ross Theile.

Maneuverability, Jr., Class A—(1) Ronald Del; (2) Oscar Puckett.

Maneuverability, Jr., Class B—(1) Bill Thumberg; (2) John Kirby.

The EBAA held a contest in October but just let us know the results the other day.

Profile Glider, Jr.—(1) Gordon Davis; (2) Walt Hubbard; (3) Jimmie Shott.

Profile Glider, Sr.—(1) Jack Dyer; (2) Jack Dyer; (3) Art Wells.

HL Glider, Jr.—(1) Gordon Davis; (2) Walt Hubbard; (3) Buddy Georgett.

HL Glider, Sr.—(1) Dave Acker; (2) James Elliott; (3) Jack Dyer.

The Los Angeles Aero Modelers, Ray O. Acord, President, held a contest November 18th with these results:

Class A—(1) W. W. Scott; (2) Ralph McLaughlin; (3) R. Randolph.

Class B—(1) H. C. Glines; (2) J. Memes; (3) John Drobhoff.

Class C—(1) Marvin Irwin; (2) Red James; (3) E. Marbut.

Juniors—(1) John Gibson; (2) Royce Childress; (3) Ray Bowerman.

Longest Single Flight—Milton Ronney, 10 mi. with motor run of 14.8 sec.

(Turn to page 70)

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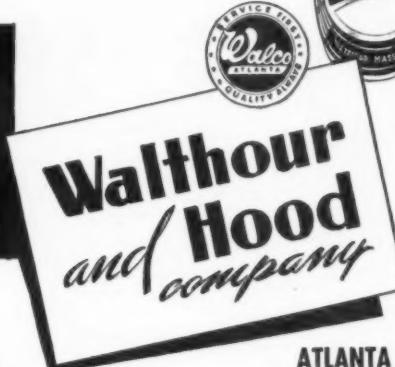
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 Part 2. Specifications of 64 Engines:
 Part 3. Blueprints & Instructions for Building 10 Models
 Part 4. Directory of 57 model engine manufacturers.
 Instruction sheets for 50 different engines
 Part 5. Dictionary
 Part 6. Manufacturers from us or your nearest jobber: Ace Model, St. Louis • Arrow Novelty, Cleveland • H. F. Auer, Milwaukee • B. C. Baker, Los Angeles • B. S. Model, Jackson, Mich. • E. Bronco, N.Y.C. • Central Camera, Chicago • City Blue, New York • C. C. Clegg, Los Angeles • D. Dallaire, Detroit • Reginald Denney, Hollywood • Goods Hobby, Dayton • Ed. Guth, Syracuse • H. H. Hobby Supplies • J. A. Handicrafts, Sacramento • Hobby Craft, Seattle • Hobby Land, Hatch • Hobby Supply, Long Beach, Calif. • Hopplins, Miami • Hy-Grade School, Oklahoma City • Landau Hobby, N.Y.C. • Hobby Master, Metal Modelcrafts, Brooklyn, N.Y. • Modelcraft Dist., St. Paul • Morgan Model, Atlanta • Nati'l Model Distrib., Chicago • Offenbach, San Francisco • Steve Patz, Milwaukee • Paul Ruth, Buffalo • Skyway, Brooklyn, N.Y. • Trost Model, Chicago • Trymco, N.Y.C. • W. G. Model Supply, N.Y.C. • R. L. Webber, Chicago.

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Georgia

The Southern Aero Engineers decided to disband and reorganize under an old name used before the war: the Atlanta Aero Engineers. For more information write Guy W. Gupton, Box 50, Ga. Tech, Atlanta.

Kansas

An AMA sanctioned invitational meet was held in Wichita on Sunday, November 18th, and the fellows below came out on top:

Towline Glider, Jr.—(1) Dean Dunlap, Class C.
 Towline Glider, Sr.—(1) Carl Unruh; (2) Stanley Swency; Class E and Class C respectively.
 HL Glider, Sr.—(1) Dick Holloway; (2) Carl Unruh; both Class B.
 HL Glider, Jr.—(1) Chuck Woodin; (2) Dan Dunlap; (2) Jimmy Brown; all Class B.

A new club has been organized at the Robinson School in Wichita and meets every Wednesday from 3:30 to 4:30. It will be sponsored by the YMCA.

Nebraska

The World-Herald and Exchange Club held another meet on November 25th at Benson Park, Omaha.

Gas Models (12-15)—(1) Charles Simpson; (1) Robert Hahn.

Gas Models (16 and over)—(1) Herbert Breitinger; (2) Jack Fluehr.

Rubber Models (12-15)—(1) Gerald Dyer; (1) Charles Rice.

Rubber Models (16 and over)—(1) Jerry Bahal; (2) Herbert Keth; (3) Wayne Whittatch.

New York

Bernard Furgang, new secretary of the Williamsburg Model Craftsman, 593 Lenox Road, Brooklyn, writes that they held their annual elections with Sid November re-elected Pres., Bernie Lavender, Vice-Pres., Sam Mogellefsky, Second Vice-Pres., John DeMatis, Treas. The club intends to have its annual contest soon for rubber control line and free flight gas. Anyone interested in becoming a member should get in touch with Bernard.

North Dakota

Grand Forks doesn't have a model club as yet but hopes to organize one very shortly when once again the old model fans arrive back from their tour with Uncle Sam's armed forces. Anyone interested can get in touch with Andy R. Brasted, 121½ South 3rd Street.

Ohio

A new club was organized in Shelby to be known as the *Shelby Balsa Buzzards*. It is primarily for gas fans, but they will welcome rubber modelers, too. The following officers were elected: Pres. Hugh Hildebrandt; Vice-Pres. David Heed; Secy. Richard Barkdull; Treas. James Barkdull; Sgt.-at-arms John Pry. The club is sponsored by the Jr. Chamber of Commerce and Howard Robinson is its director. For more information write Hugh Hildebrandt, 22 Boulevard, Shelby.

Pennsylvania

The Flying Hornets Racing Club is not only an organization for model plane builders but also includes race cars, motor boats, etc. They hold meetings every other Wednesday at 7:30 p.m. in Ludwick's Hobby Shop, Arch St., Perkasie. For more information write Elymus Nase, 617 Arch St., Perkasie.

Rhode Island

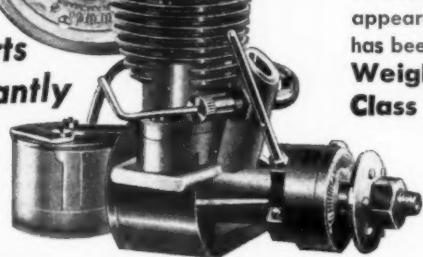
On January 17, 1945, eight experienced model builders organized the Rhode Island Aeromodelers and elected the following officers: John Pyne, Pres.; Jerry Marvillo, Vice Pres.; Walter Allen, Secy.; (Turn to page 72)

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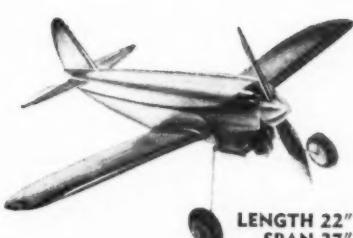
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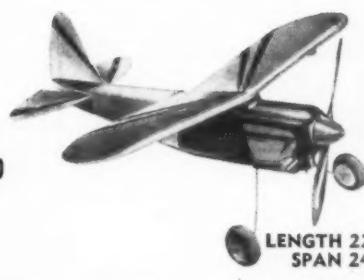
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THREE BLADE (Laminated):
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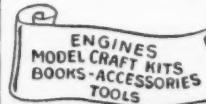
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Norman Hartman, Treas.; and Bernard Collins, Contest Director. Members range in age from 10 to 16. The club is self-supporting, money being used for expenses coming out of membership dues. They meet twice a month. Now celebrating its first birthday the club welcomes new members and invites interested parties to contact them at *Rhode Island Aeromodelers*, 380 Elmwood Ave., Providence 7.

Tennessee

The *Nashville Banner* will sponsor a state-wide model meet at the Cornelia Fort Airpark early this spring. Awards will amount up to \$500 in the hope of getting many young people interested in model flying. Trophies will also be given to various leaders and organizations in the field of aviation. All modelers interested in participating in this event should write the *Nashville Banner* for further information.

Washington

A new club has been formed in Yokina called the *Aero Scrappers*. The secretary, Bob Schultz, thinks things have started out perfectly with 15 members at the first meeting. Officers elected were: Tom Smith, Pres.; Bob Schultz, Secy.; Blanchard McLeigh, Contest Chairman.

Holland

A. Stolk, Dordtschelaan 158d, Rotterdam, Z., has asked us to put his name in *Club News* in order to find contacts among other model builders. He would like to receive photographs and drawings together with old copies of aviation publications. Due to the Nazi invasion he has been unable to secure any of these from 1940 until today, when once more he finds himself in a free land.

Argentina

Joe S. Ortner writes that in early December the Argentine speed record for U-control models was broken by the *Hillcoat-Fistrin* duet with their own design and motor by reaching the speed of 155.170 kms per hr. (approx. 96.42 mph).

England

Any of our English friends interested in joining a model club may get in touch with the *Woodford and District Aeromodellers Association* at Ashton Playing Fields, Woodford Bridge, Essex, Saturday evenings. L. G. Temple is Pres. Another club is the *Stockton and District MAC* at 11, Station Road, Norton, co. Durham; T. S. G. Seaward, Pres.

The following article was received from Stewart P. Elliott, one of the West Coast's most active promoters of the educational value of model making.

MODEL BUILDING BUILDS HIGH I.Q.'S
by Elise Mannel

WHEN a boy builds a model of the Constitution or some famous clipper ship all the romance and adventure of early American naval history "comes alive" for him. He no longer thinks of the early voyagers who sailed from our New England coast around the horn to China as remote figures in a history book, but as part of an adventure in which he has taken part. As he builds replicas of their ships, the exploits of John Paul Jones, the adventures of buccaneers become part of the living fabric of the America he lives in. He has (literally) a finger in the past. No wonder he's more alert and better informed than his next door neighbor whose chief pastime is reading dubious comics that substitute a glut of cheap adventure for the creative urge.

A boy who feels the glow of accomplishment that comes when he completes a well-built model has enlarged his ca-

(Turn to page 74)

GET READY NOW! FOR THE SUMMER MEETS

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Please indicate a second choice when ordering motors.

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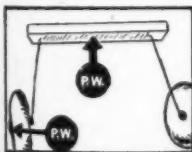
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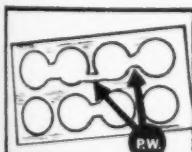
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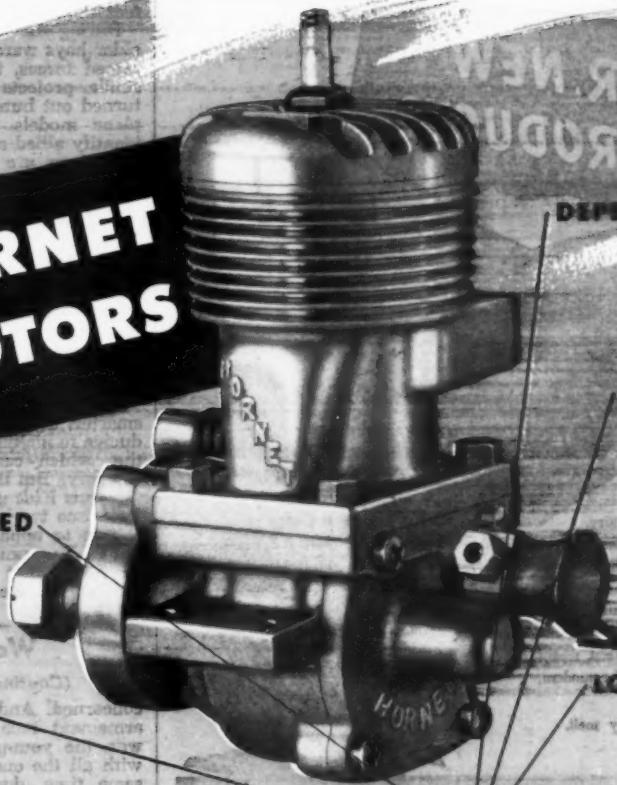
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complete: MODEL "60-A" for guide line or free-flying planes.
MODEL "60-B" for boats.
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Hobbycrafts, 1327 J Street, Sacramento, California.
Territory: Washington, Oregon, California, Nevada, Idaho, Wyoming, Utah, Colorado, Arizona, New Mexico.

Model Aircraft Dist.,
2548 Nicollet Ave., Minneapolis, Minn.
Territory: Montana, North Dakota, South Dakota, Nebraska, Minnesota, West, Wisconsin.

Trost Model Airplanes & Hobbies,
3111 West 63rd St., Chicago 29, Illinois.
Territory: Eastern Wisconsin, Michigan, Iowa, Illinois, Indiana, Ohio, Kansas, Missouri, Kentucky, Tennessee.

Mod-Kraft Co., 840 Union St., New Orleans 12, La.
Territory: Texas, Arkansas, Louisiana, Mississippi, Alabama, Georgia, Florida.

Corr's, 812 Ninth St. N. W., Washington 1, D. C.
Territory: Maryland, West Virginia, Virginia, North Carolina, South Carolina.

Polk's Model Craft Hobbies,
314 Fifth Ave., New York 1, N.Y.
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See your dealer, or order direct by mail.



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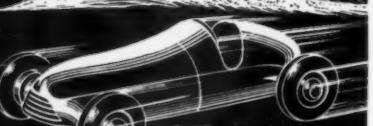
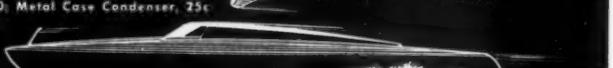
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*It takes a winner to make a Champ.
Be sure you use genuine AERO SUPER COILS!*

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HICKSVILLE, L. I., N.Y.

making models, we feel they have the feet on the right road."

During the war, although most of the older boys were working or entering the armed forces, the Junior Museum, like similar projects all over the United States, turned out hundreds of little black solid plane models used to teach flyers to identify allied and enemy planes.

"But we are proudest of our gliders," Mr. Walker explained as he showed us towline models of various types. And he has good reason to be proud of the gliders. At the second annual Plane Meet of the San Francisco Junior Chamber of Commerce held at the Polo Field in Golden Gate Park recently, close to 250 models (including gliders and motor-propelled planes) were entered. In the towline glider events the first 4 places in both junior and senior divisions were won by Junior Museum entrants.

Whether model-making makes boys smarter, or whether high I.Q.'s are conducive to making models, is a question in the which-came-first-chicken-or-egg category. But the fact remains that when the Quiz Kids gave their program in San Francisco two of the children (out of 7) chosen to appear were members of the Junior Museum Model Airplane Club; an indication that model-making and high intelligence are more than casually related.

World War I

(Continued from page 34)

concerned. And in the face of a world armament race to satisfy the needs of war, the young engineer went to work with all the energy of youth. About the same time, down in Barcelona, Spain, Marc Birkigt was working on a radically new type aviation engine which possessed a phenomenally low horse power/weight ratio. Thus the stage was set for something big.

After successfully producing the Spad S-1 to the order of the Russian government early in 1915, Bechereau returned to his drawing board and quickly designed Spad airplanes up to type 7C1. In terms of 1915-16 aerodynamic design, the S-7 was as radical as the atomic bomb, and was the result of the combined efforts of our trio. With blueprints of Birkigt's engine before him, Bechereau had designed the S-7 around it. Arrangements were made for the engine's production in the Paris Hispano Suiza factory to insure a constant supply. Bleriot, meantime, built additions to his factory to manufacture the airplane in large quantities.

Characteristics

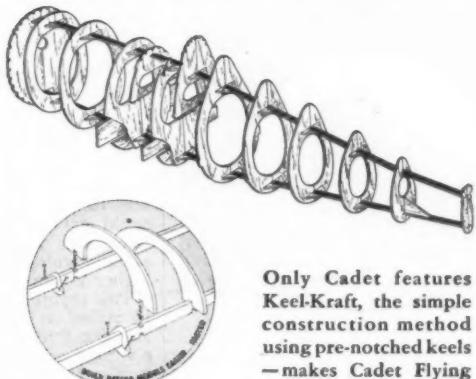
As originally designed, the Spad 7C1 was powered by the 140 hp Hispano Suiza engine, type 8A. Because of its extremely thin airfoil it was dubbed the "flat wing" and in the early days was known more by that nickname than by type number. It was a mighty nervous group of men that stood on Bleriot field one morning in July 1916 when the first S-7 was about to demonstrate the theories of its engineers. Berchereau had watched the ship's construction like a hawk, had actually helped the shop workers make parts for the first plane and put them together. Birkigt personally supervised manufacture of the Hispano Suiza 8A that now ticked over in the Spad's clean nose. And Bleriot, among the group, had a fortune tied up in the ideas of the men he trusted to create something new and better and so sorely needed by his native France. Each had

(Turn to page 78)

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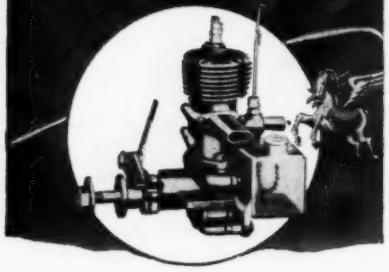
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SPECIFICATIONS

Bore and Stroke	.9 in.
Displacement	.57 cu.in. (Class "C")
Horsepower	.25 hp at 6500 rpm
Max. Speed Range	1,000 to 15,000 rpm
Engine Weight	9.5 oz.
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his personal future tied up in that radically new airplane.

At the conclusion of the first test flight their fears had been dismissed. Bechereau and Birkight listened eagerly to the test pilot's report of the plane's and engine's performance and they were far from disappointed at what they heard. Sea level top speed proved to be 123.5 mph—about 5 miles more than anticipated. And its rate of climb was good for those days—9 min. 50 sec. to an altitude of 10,000 ft. Further testing at Villacoublay aerodrome disclosed that the 140 hp Spad S-7 had a ceiling of 15,000 ft., and an air endurance of exactly 2 hrs.

The ship officially weighed in at 1100 lbs. empty and 1551 lbs. fully loaded. Wingspan was 25.8 ft., overall length 20 ft., and height 7.2 ft. Wing area of 192 sq. ft. gave a wing loading of 8.1 lbs. and power loading was just 11 lbs. The one synchronized Vickers machine gun fitted to the original S-7 remained standard throughout the type series. Good as it was for the times, Birkight thought he could get more out of the engine and Bechereau agreed to redesign the ship aerodynamically to take advantage of the higher power output.

The result was a second model, still identified as the S-7 but fitted with the Hispano Suiza 8Aa engine and possessing a wing area increased to 195 sq. ft. Structurally beefed up and with a thicker airfoil, the new Spad S-7 had a ceiling of 18,000 ft., better high altitude performance, but a lower top speed—119.5 mph at 6500 ft. Rate of climb to 10,000 ft. was reduced to 11 min. 30 sec. as the penalty for obtaining better maneuverability. Air endurance was increased 10 min. over the original, power loading was reduced to 9.04 lbs. and wing loading slightly improved at 8.08 lbs. Through ingenious design the new model retained the same empty and gross weights in spite of a heavier engine and larger capacity radiator system. This model of the Spad 7C.1 was constructed in large numbers during late 1916 and early 1917, winding up production in July of that year.

As the German Imperial Air Service bent its efforts to the destruction of Allied rear area positions by utilizing their Gotha, Friedrichshafen and A.E.G. bombers, the need for a faster climbing type became apparent to Bleriot. Accordingly, and in anticipation of demands to come later from the French government, he brought Bechereau and Birkight into a huddle to see what they could do about improving Spad 7 performance. Since the answer was to be found in higher horse power, Birkight set to work increasing the output of his Hispano Suiza engine and developed type 8Ab, which gave 205 hp at 1800 rpm. Bechereau, meantime, had beefed up the S-7 once again to take added power and soon both plane and engine, modified for what today would be classed as interceptor duty, came rolling off their respective production lines.

This third model Spad 7C.1 reached the front in September 1917, about the same time as the first models of Spad 13C.1 which it exceeded in several details of performance. The last model S-7 had a speed of 132 mph at 6500 ft., climbed to 10,000 ft. in 8 min. 10 sec. and had a service ceiling of 21,400 ft. Empty and gross weights remained the same as in the second model by virtue of the fact that fuel capacity was reduced to provide a full throttle endurance of only 1½ hours.

The rapidity with which these Spad airplanes could be modified and put into production is a tribute to French production genius in World War I. The primary

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FUSELAGE—Easy to build. 31" length provides 26" rubber motor for those long flights required by control models. Rugged construction that withstands great abuse.

WING—Hefty leading and trailing edge combined with a warp preventing spar and solid wing tips that can take the gaff of street flying. One piece wing clear thru the fuselage which is provided with sheet inserts at this point. Thin airfoil cuts drag and really makes Tory just loop galore without any fear of wing failure.

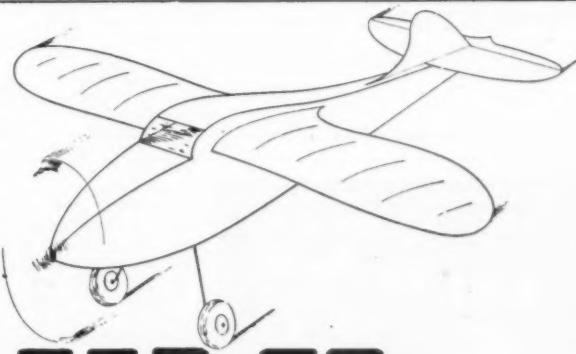
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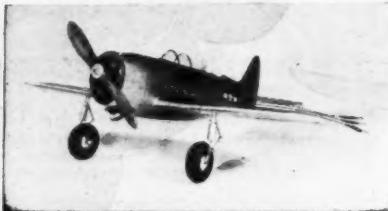
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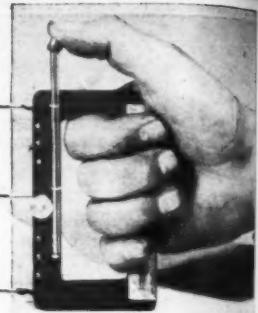
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consideration at the time was to obtain a certain rated performance even if it meant sacrificing some other good quality in the airplane. The explanation of the rapid engine improvement was that of natural refinement. Those Hispano Suiza engines generally were handmade by skilled mechanics, with the result that little if any production tooling was disturbed by a production change. This did not permit true manufacturing efficiency, and interchangeability of parts was out of the question. But production such as that helped win the First World War in spite of its apparent faults.

Spad 7 Flight Characteristics

There have been many references to the Spad 7 being a death trap with the engine off—it had the gliding angle of a brick! A lot of pilots did meet their end when the engine cut out just after take-off. But given sufficient altitude the S-7 could be held in a rather steep, fast glide from which a safe landing could be made on reasonably level ground. Normal landings were made power-on at about 75 mph. When the ship settled it was best landed tail high at about 60 mph, just before stalling speed was reached. The landing roll was short due to the braking action of the heavy tail. Taxiing was accomplished best at rather high speeds and with the stick held forward in order to lighten tail skid loads.

Taking off in a Spad 7C.1 was somewhat like riding a bucking broncho. It was necessary to hold the stick well forward as the ship accelerated in order to get the tail off the ground. When a speed of 75 or 80 mph was reached the ship became light and slight back pressure on the stick would lift it off the ground. Since the S-7 had to be flown at all times it was tiring to fly and required perfect

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J. N., Breckenridge, Minn.: Am having good results from my motor.

E. D., Pleasant Hill, Mo.: Received my G.H.Q. motor in fine shape. Very well satisfied, and think it is a small little motor, runs fine. A friend of mine wants one, too, so wanted me to order it for him.

C.C., South Hill, Va.: I bought a G.H.Q. engine from you last September and installed it in a six foot wingspan airplane. In engine performance, the engine you sold me passed with flying colors. I congratulate you on putting so much performance in my engine at so low a cost.

C. F., Pittsburgh, Pa.: My G.H.Q. engine has given very satisfactory service for several years now.

E. S. J., Tallahassee, Fla.: I have a G.H.Q. engine that I purchased from your company a short while ago and it operates satisfactorily.

N. L. B., New York, N. Y.: I received my G.H.Q. motor in fine shape. It runs swell, and I am sending another order to you.

M. B. H., Omaha, Nebr.: I think the G.H.Q. motor is the best motor I have ever seen.

A. Z., Texarkana, Tex.: I have had about seven of your motors in the past and think quite a lot about them.

R. D., Glen Allen, Va.: I started it with only a few turns of the propeller and was very pleased with it.

J. M., Arlington, Va.: I've had one of your motors for about three years now and it's still going strong.

C. L. N., Amarillo, Tex.: Before my induction into the Army I built a few models which incorporated your G.H.Q. motor. I found it satisfactory and put a great deal of faith into it because of its dependability.

B. D. J., San Francisco, Calif.: I already own one of your G.H.Q. engines and it performs like new.

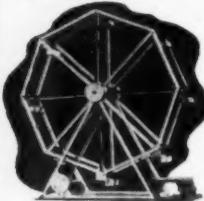
D. B. R., Jr., Litchfield, Conn.: I purchased one of your engines a few years ago and it is still in working order. I have used it in boat models, with great success. I am particularly impressed by its easy-starting qualities. These are very valuable in a boat, where it is more difficult to start an engine. Usually, only one attempt is needed once the engine has been primed. As a matter of fact, my G.H.Q. motor starts easier now than when I bought it. The motor has satisfied me very much.

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coordination of controls to effect combat maneuvers. But a pilot who knew how to handle his *S-7* properly was a formidable opponent for any German plane of its day.

The *Spad 7C.1* was retired from replacement stores early in 1918 although several squadrons continued to operate with it as standard equipment right up to the Armistice. Several hundred *S-7s* were constructed in England for the R.A.F., and they were supplied in large numbers to other Allied forces. Next month, Part II of this article will present a complete design and structural description of this famous World War I fighter.

Unorthodox Design

(Continued from page 33)
parachutes or folding wings, should be made for this eventuality.

Fig. 4 illustrates an idea for a new application of jet propulsion. The propelling gases are to be directed over the upper surface of the wings and rearward, thus providing a powerful airflow over the wings at a touch of the throttle.

The crosssection view of the wing with jet motor mounted internally shows that this would be accomplished. Rudder and aileron control could be eliminated in a full scale ship and turning and banking arrived at by throttling selectively the motors in each wing. One obvious advantage of a large plane built to this pattern is that icing conditions would offer no hazard to a plane flying with upper surfaces and leading edges of the wings normally operating at a temperature of nearly 100° above freezing.

This type also offers much promise as a model—when small jet motors become available—and they will. With the powerful blast of a jet motor acting upon each wing, models of this type may some day supplant the top heavy looking pylon jobs which have ruled supreme in duration contests to date.

Fig. 5 is a winged gyroplane design with two possible variations, neither of which would alter the outside appearance of the ship. Of batwing design, each wing would contain a three bladed rotor which could be either power driven or autorotational. Forward motion of the ship would be accomplished by either jets or propeller in the autorotational model and in the power driven rotor model by slanting the rotors.

An arrangement of this sort might be the answer to the long take off runs now required with jet propelled ships or might make possible a helicopter design with good gliding characteristics.

To make a model along these lines a good high speed power transmission is needed. Either connecting rods or light gearing is indicated as it is doubtful if pulley and belt transfer would work well at the high rotor speeds which would be required.

For an autogyro version the problem is much simpler. Here, a pusher propeller would probably be the best bet. In either case the long fuselage would provide plenty of room for the rubber motor.

This design offers intriguing possibilities for a large ship using a turbo-jet motor with power takeoff from the turbine to operate the rotors—jet plane forward speed with helicopter climb. What an interceptor that would make!

The models presented here, several of which as mentioned have been actually test flown, are but a few of the infinite variations possible in the pursuit of "Unorthodox Design." Who knows but that the design of the future may be evolved by some earnest model builder trying out such radical contraptions.

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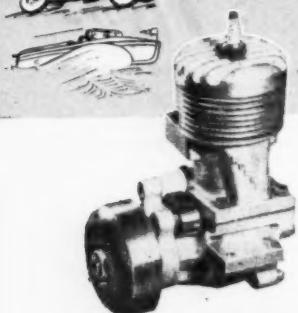
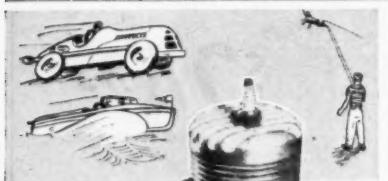
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Control Line Flying

(Continued from page 23)

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(Turn to page 86)

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9" 8c 25c 50c
10" 9c 25c 50c
11" 10c 25c 50c
12" 11c 25c 50c
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1/2" x 4" .30 45c
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1/2" x 2" 20c 20c
1/4" x 3" 20c 20c
1/2" x 3" 25c 25c
1/4" x 4" 25c 25c
1/2" x 4" 30c 30c
1/4" x 5" 30c 30c
1/2" x 5" 35c 35c

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1/4" x 22" 125c
1/2" x 22" 135c
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56" Span. Length 37½". Free Flight

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lateral stability is of no great consequence, low wing pursuit planes can be flown as easily as a Parasol. For instance, scale models of the German Messerschmitt 109 with its long tail moment have been flown at speeds of around 100 mph, and other fighters such as our famous Thunderbolt have turned out to be exceptionally fine stunt planes. In scale models the only change, nearly always necessary, is an increase in horizontal stabilizer area to counteract loss of efficiency due to scale effect.

Perhaps the reader has a burning desire to build and fly his own "dream ship"—the ultimate ambition of all aeromodelers—only it should really be a "dream" and not a "nightmare." Too many weird and wonderful contraptions resembling an airplane only in the most abstract sense have been pulled through the air by a propeller, their proud creators making amazingly fantastic claims of speed and efficiency but not one of these little aero-trotics has yet come anywhere close to being justified in bashfully blasting the well known fanfare "135 mph and then the lines broke." It would be prudent to first analyze and compare a projected design with some successful model in mind, and should it fall ridiculously short of the well tested ideal it would be better strangled before birth. As a matter of fact, a new design cannot digress too far from reason if the present AMA rules for tethered models are observed since these rules regulate the minimum wing area for each class, and it is now out of the question to support a Hornet engine on 100 sq. in. of wing area (yes, it has been done) and not risk a severe tsk! tsk! from the rules committee; which brings up a point that should be mentioned here though it is not strictly speaking part of the business in hand.

It is absolutely false to assume that "anything will fly on a string." Centrifugal force alone will only slightly assist the takeoff and a little smart work with a slide rule will prove that infinite velocity is required to retain wingless projectile horizontal to its center of rotation.

For example, assume that it is required to raise an airform with zero lift, attached to a 50 ft. line anchored 5 ft. above the ground, 2 ft. into the air:

According to the formula

$$V = \sqrt{\frac{32.16 \times (r-d)}{2.15 d}}$$

where V is equal to the Velocity required in mph, r is length of line in ft., and d the depression from horizontal in ft.; then:

$$V^2 = \frac{32.16 \times (5-2)^2}{2.15 \times 3} = \frac{32.16 \times 2491}{6.45} = 12,420$$

$$V = \sqrt{12,420} = 111.5 \text{ mph}$$

Well, that's getting into record breaking brackets and the wingless model has only struggled two feet into the air; to get her up to where she is travelling only a 1/2" below horizontal she'd have to burn up the atmosphere at somewhere near 950 mph, still resigned to the fact that unless she sprouted a small pair of wings she could never go fast enough to climb that additional half inch.

It should be clear from the foregoing that an airfoil must develop lift sufficient to overcome gravitational pull when it gyrates above the height and below the velocity at which centrifugal force is an advantage, or where, as is the case of flying above horizontal, it has a definite

(Turn to page 88)

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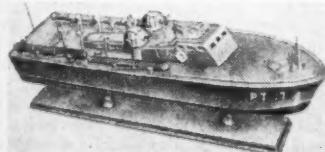
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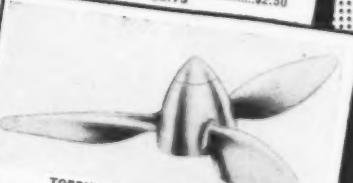
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tendency to force the model groundward and is therefore an additional negative factor to be overcome by lift. All of which is a way of saying that the amount of lift developed at L/D max. by a particular wing at a particular Reynolds number (say 200,000 for average control line conditions) must *more* than equal the weight of the model if any degree of maneuverability is desired. If the above smacks too much of pedantry the reader may ignore the proof so long as he concedes the fact, making sure that the "dream ship" has enough wing area and the "primary trainer" a little more than just enough. (AMA rules limit wing loading to 48 ounces/ft.². However Trainers should not exceed 20 ounces/ft.² and Advanced Trainers 28 ounces/ft.²)

Finally, some words and a little dual instruction for the pilot about to fly his first control line ship. Only U-control technique will be dealt with for it will apply to G-line practice also.

On a calm day gather up the equipment consisting of one friend, 100 ft. of 16 lb. test silk line, tool box and model, then find a smooth piece of ground free from any brush or weeds which might foul the lines. Hook lines to model and, after making sure they are of identical length, attach them to hand grip. The pilot's position relative to the wind should be such that the model starts off downwind.

Pull gently on the lines and work the elevator to see that everything operates smoothly, then lay the handgrip down with lines running straight and untwisted along the ground. Start the motor on no more than enough gas to last about 90 seconds; open to half throttle, never "all out" for the first try, and instruct your helper to head model slightly out of the circle and not to release it until signalled to do so. Make all spectators including small boys and dogs move well clear of the flight circle and *keep them away*. Control line flying is safe if common sense precautions are observed, but careless checking of lines for weak spots or inadequate policing of the spectators can result in serious injury.

Grasp the handle and check operation of elevator once more; satisfied that everything is set, signal all clear to the helper and . . . watch it! Don't try raising the tail by bearing down on the stick! . . . See! she's gained a little more speed and the tail is free by itself . . . look at the way she's bouncing and grabbing for air . . . Nope! she's not doing any 100 mph—30 mebbe . . . No! No! don't horse back on the stick like that—gently does it—you're airborne—at 15 ft. altitude level out and keep her steady—don't jerk, easy man . . . There, that's better. Feel the pull of those lines? See the way she answers every tiny movement of the stick? . . . Say! that's great—steady as a rock . . . She's coughing now—get ready to maintain line tension and give a little up elevator when the motor finally quits . . . Nice work. . . Well! that's that—not quite 4 laps and you already have the feel of it a little. Not enough tension on the lines you think—OK, we'll give her a little more rudder or offset the thrust a few degrees.

Try a few more laps to check new adjustments and further familiarize yourself with the stick, add revs. each trip until she becomes airborne without a struggle—then the big moment arrives.

This time really make her scream, check the lines and wind direction—your ship should always head downwind for the takeoff. Hey! what's the matter fellas—nervous? Heck, we've never lost a pilot (Turn to page 90)

IT'S NEW

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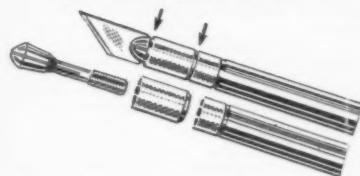
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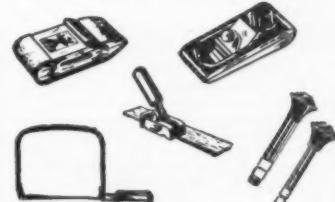
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yet . . . Signal the helper. . . Nice take-off . . . Careful now—don't climb her into the wind too steeply. . . Try a shallow dive—Ouch! you sure waited long enough to pull her out. You've got to start to bring a ship out of a maneuver 'way ahead of where you expect her to answer; remember she's travelling maybe 10 ft. in a tenth of a second—not much time for the pause that refreshes. . . Say, that wind sure has gotten strong . . . that's the way, step back to keep your lines taut. It takes only the smallest corrective movement to keep her level. . . There's the warning sputter from the motor—bring her down to within a couple of feet above the ground and wait for it. . . There now, ease back on the stick. . . Steady! . . . A perfect 3 point. . . From now on you are on your own, but how about installing a switch before flying again so you can cut the motor at will by means of a third line?—Happy Landings!

Next month the plans will be published for a control line job which may be classed as an Advanced Trainer; that is, although the Fury III was not designed to chase that 135 mph (and the lines broke) mark, it was developed to fill the need for an easily managed sporty job capable of clipping along at around 60 to 70 mph with a small Class C motor and yet have landing characteristics far removed from the streamlined brick approach of the really vicious super speed jobs.

The reasoning behind the design of Fury III will be detailed in the hope that it may serve as guide to the reader in designing his own should he so desire; and something will also be said about special factors to be considered in piloting the "hotter" types of aircraft.

(Part 2 will appear in the next issue.)

Flash

(Continued from page 2)

needed effect of this new Board. The atomic bomb, jet and rocket propulsion, guided missiles and the nature of modern air-war demand a new and daring approach to the subject of national air policy. Perhaps the Mitchell Bill will provide just that.

THE LARGE GRUMMAN amphibian mentioned last month in these columns is now revealed as the Mallard with 67 ft. span, 48 ft. length and accommodations for 8 passengers and 2 crewmen. To sell for \$80,000, the twin engine monoplane will cruise at 180 mph for 570 miles with full load, or 1100 miles with 4 passengers. It will resemble the famous Grumman Goose and Widgeon designs.

TRANSCONTINENTAL SPEED record was broken December 8, 1945, by the radical Douglas XB-42 Mixmaster. Streaking across the 2295 miles from Long Beach, Calif., to Washington, D. C., in 5 hrs. 17 min., averaging 432 mph, the strange craft beat the unofficial record by 46 min. and the official record by 1 hr. 15 min. Examination of the closely-guarded craft in a hangar at Bolling Field, Wash. D. C., reveals an astonishingly smooth exterior surface, an ingenious (though ponderous) retractable main gear which folds aft and inward into the fuselage, and rear-firing fixed cannon in the wing. The 3 place bomber, prototype of the forthcoming DC-8 commercial model, gives twin engine power with single engine drag, keeps the nose free for bombardier operation and maintains absolutely unaltered trim in the event of engine failure. . . Shortly after its ar-

(Turn to page 92)



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rival at Washington the ship crashed and was completely wrecked while on a local flight. The 3 occupants parachuted without injury. Although official comment is not yet forthcoming, reports of witnesses make it appear the crash was due to engine trouble rather than to any structural failure brought about by the ship's radical design.

FIRST LANDING of a jet propelled airplane on an aircraft carrier was made last Dec. 4 by Lt. Comdr. E. M. Brown, Chief Test Pilot, R. N. when he brought the De Havilland Vampire in at 95 mph and dropped to the deck of a British 14,000 ton carrier. The first cable was picked up in less than 100 ft. The Goblin jet unit develops 3000 lbs. static thrust and gives the Vampire a top speed of 540 mph. Four landings were made during the day, yet there has been no reference to a takeoff!

SOME DATA ON the nature of war in the future comes in the revelation of the Northrop JB-1A, a 20th century weapon out of the next. The flying wing bomb is powered by two German type athodyd units built by Ford Motor Co. The explosives are carried in two large bulges on either side of the single air intake. The JB-1A weighs 3½ tons, has a range of 100 miles at 350-400 mph. A later model, smaller and faster, mounts a single jet unit and carries explosives in smooth, cast magnesium sections in the wing. The missiles are launched from Northrop-designed and produced tracks by electrically ignited rockets. The wing is mounted on a special sled and the four rockets give it a speed of 220 mph at the end of the 50 ft. track. Northrop began "buzz bomb" experiments in the summer of 1944 and has delivered more than 1000 sleds and a number of missiles to the AAF.

FIRST NAVY JET is the Westinghouse Yankee gas turbine which has a diameter of only 19". An even smaller unit, with a 9½" diameter, has also been developed. This unit is the first all-American design and produced gas turbine engine.

LATEST BRITISH TYPES have been revealed in displays for the public in England. The Fairey Spearfish is the first British torpedo plane to carry its weapon entirely within the fuselage. It is powered by a 2585 hp Bristol Centaurus engine driving a 5-blade Rotol propeller. It is a large, 60 ft. span, plane weighing 12 tons and mounting power-driven gun turrets. The Supermarine Seafang is a Navy version of the fast Supermarine Spitfire R.A.F. fighter. The Martin-Baker M-B V is a Mustang-like fighter with welded steel tubing structure instead of the monocoque of the American counterpart. The M-B V differs, however, in the fitting of counter-rotating three blade propellers. The Hawker Sea Fury is a ship-board version of the Tempest fighter but uses the five blade propeller. The De Havilland Sea Hornet is, naturally, a Navy version of the Hornet and is equipped with hydraulically folding wings; the Supermarine Seafire, a Navy Spitfire equipped with counter-rotating propellers. The first Bristol 170 has been successfully test flown. The all-cargo version is the Freighter; the 40 passenger model is the Wayfarer; span is 100 ft. and the craft cruises at 200 mph. It will be built in quantity.

LOOK FOR MORE and more Army Air Forces record-breaking attempts, distance, speed, altitude and load-carrying. Arnold's last program is an all-out attack on record-breaking. (Turn to page 9)

THE SWIFT — The original all metal plane built with semi-monocoque type construction.

TAYLORCRAFT — The "aerial jeep" of World War II, feared by the enemy for its accurate artillery spotting.

ERCOUPE — coordinated easy to fly because of spin.

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WORLD'S LARGEST amphibian, Martin XPBM-5A, has been successfully test flown at Baltimore, Md. The giant craft is a redesigned PBM *Mariner* with retractable tricycle landing gear.

THE TYPE OF PLANE that gives British designers their bad comparison with U.S. counterparts, despite their many outstanding (and sometimes admittedly superior) successes, is represented by Vickers-Armstrong Windsor B Mk. 1 bomber. This strange hybrid, officially compared to our Consolidated Dominator B-32, is a nightmare of four engine nacelles, each with a single wheel landing gear (the outer gears 50 ft. apart!), hard brutal angles, and a covering composed of fabric interwoven with wire! In an area of Boeing B-29's and Lockheed P-80's, it is difficult to categorize this boxlike brute as anything more modern than circa 1935.

BUT THE BRITISH continue to pound ahead in their research and development of the aviation gas turbine engine. At Farnborough, England's Wright Field, the Rolls-Royce Nene and the Metropolitan-Vickers F2/4 were revealed recently. The Nene is the first jet unit with 5000 lbs. of static thrust to be placed in quantity production. Also displayed were the Armstrong-Siddeley ASX, an improved design, and the Whittle W2/700/B, latest and most powerful of the continuing and highly successful original jet engine.

SOMETHING OF THE amount of work done by a jet engine is shown in the recent announcement that the G-E I-40 jet unit (Lockheed P-80, Bell XP-83) pumps 55,000 cu. ft. of air per min. Faced with the task of building an adequate wind tunnel to test this unit, G-E project engineer N. F. Frischhertz decided on a far cheaper idea: the unit was installed in the tail of a Consolidated B-24 Liberator bomber. Tests resulted in the Liberator (once in the air) being flown by the jet unit alone with all four engines cut off! (By comparison, a double-row radial engine pumps less than 5000 cu. ft. of air per min.)

CURTISS XF14C-1, discussed in these columns over the past three years, has now been released. As we warned, it is not a spectacular new design but only an Army Air Forces P-60E in Navy markings. Curtiss XF15C-1 is new, however, and worth waiting for.

THE TWENTY BOEING Stratocruiser transports ordered by Pan American for \$25,000,000 will be powered by four Pratt & Whitney R-4360 Wasp Major 3300 hp engines. The 80 passenger giants will cruise at 340 mph. Deliveries will begin in November of this year. The Stratocruisers will weigh 135,000 lbs., make the coast-to-coast schedule in 8 hrs. 33 min.

THIS NEW AND powerful "quadrirow" radial engine, the Wasp Major, has developed 3650 hp military rating and is also used in the Douglas C-74 Globemaster, Martin Mars commercial, Republic Rainbow, Consolidated B-36 super-bomber, Boeing B-50 Superfortress, Goodyear F2G and the new Boeing XF8B-1 fighter. Its design was begun late in 1940 and it was first test flown in May, 1942. It is only 1" larger in diameter than the original 410 hp Wasp engine of 1925!

LIEUT. GEN. James H. Doolittle, one of the most popular American airmen in or out of service, has finally set at rest the rumors concerning his "postwar" plans by returning to Shell Oil Co., as Vice-President in charge of aviation operations. He will be named a director of the company shortly.

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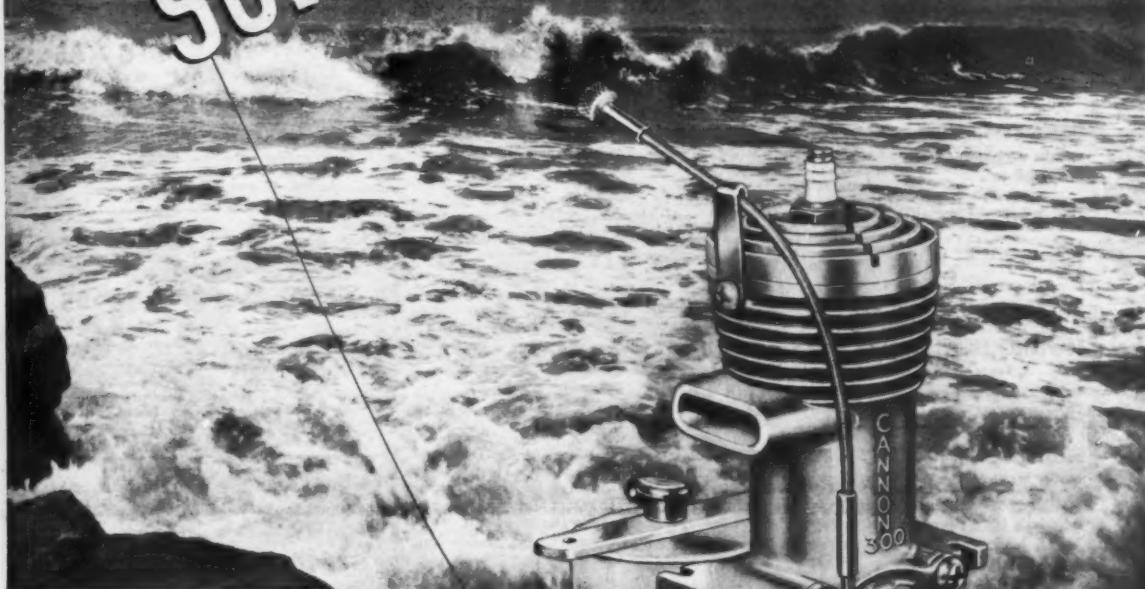
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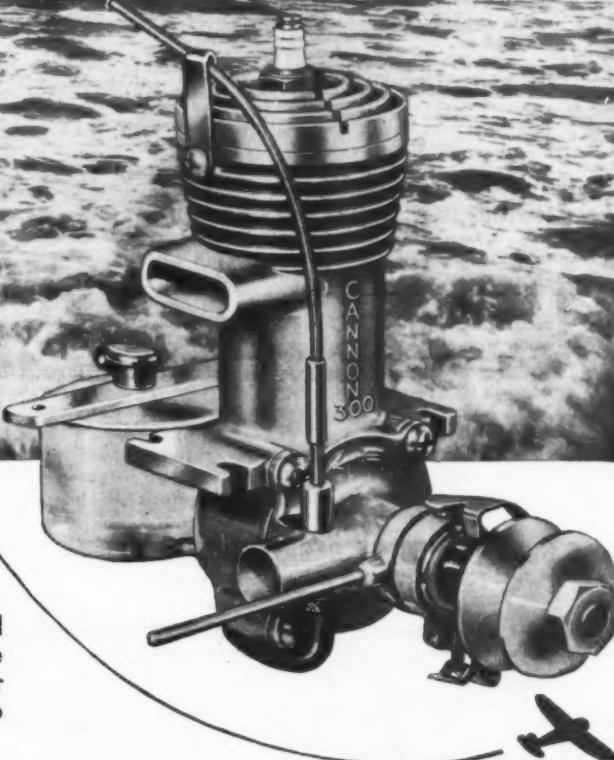
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Complete with Plug,

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6 foot Wingspan—For Class "C" Engines
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Model meets A.M.A. Requirements for Class "B"; takes Class "A", "B", or "C" Engines.	

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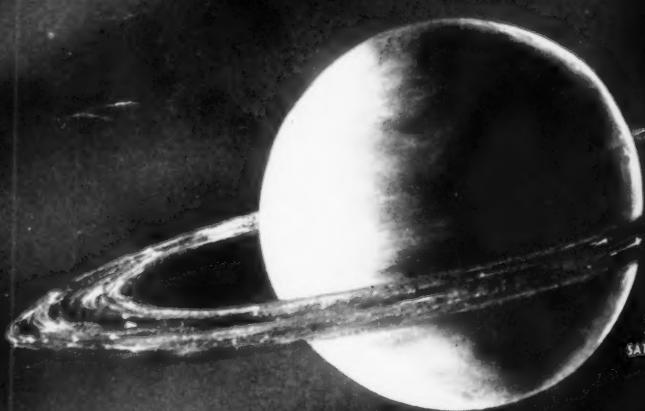
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